

DOE/NASA CONTRACTOR REPORT

DOE/NASA CR-150788

DESIGN PACKAGE FOR CONCENTRATING SOLAR COLLECTOR PANELS

Prepared from documents furnished by

Northrup, Inc.
302 Nichols Drive
Hutchins, Texas 75141

Under Contract NAS8-32251 with

National Aeronautics and Space Administration
George C. Marshall Space Flight Center, Alabama 35812

For the U. S. Department of Energy



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CONCENTRATING SOLAR COLLECTOR PANELS
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U.S. Department of Energy



Solar Energy

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16. ABSTRACT This report contains information used to evaluate the design of the Northrup concentrating collector. Included are the System Performance Specifications, the applications manual, and the detailed design drawings of the collector. The Northrup concentrating solar collector is a water/glycol/working fluid type, dipped galvanized steel housing, transparent acrylic Fresnel lens cover, copper absorber tube, fiber glass insulation and weighs 98 pounds. The gross collector area is about 29.4 ² per collector. A collector assembly includes four collector units within a tracking mount array.					
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APPLICATION MANUAL

FOR

NORTHROP CONCENTRATING SOLAR COLLECTOR PANELS

MF-NSC-P "ML" SERIES

MODEL NSC-01-0732

GENERAL DESCRIPTION: "ML Series" Solar Collector Panels comprise a complete packaged array consisting of collector panels, supporting framework, insulated fluid manifolding and tracking drive system, shipped from the factory in unassembled components for field erection. Each collector panel has four lenses, each having a net aperture of 10.75 ft^2 making a total of 43 ft^2 for each collector panel. Overall size of each collector panel is $58 \frac{3}{8}'' \times 133 \frac{5}{8}''$. Panels are spaced $10'-0''$ on center. Various components are described as follows:

Lens: Modified, Fresnel, prismatic lens extruded from acrylic. Transmissivity of acrylic is 0.95. Lenses have an 8" outside radius and short focal length with precision manufacturing for high efficiency. Concentration is 10 to 1.

Absorber Tube: Made of copper, formed to an elliptical shape for maximum collection for all seasons. Absorber tubes have selective coating having an absorbtivity of 0.95 and an emissivity of 0.12.

Collector Panel Housing: Constructed of galvanized steel, consisting of light trusses, heavy torque bar, and heavy end beams, all designed to provide a rigid panel. This framework is covered with light gauge galvanized steel to form the complete housing.

Insulation: The collector panel is insulated with fiberglass having a "k" factor of 0.28 at 200°F . Thickness of this insulation is 3" in bottom, $1 \frac{13}{16}''$ in ends and sides and 1" at each side of absorber tube, extending up 8".

Framing Supports: Each collector panel is supported by a double "A" frame, as shown on DWG. 01-05-122, constructed of heavy gauge galvanized steel to withstand loads as indicated on Figures 2 and 3. Frames and collector panels are spaced $10'-0''$ O.C. The frames are connected together with struts and braced by "X" wind bracing. All fastening devices are zinc plated and are furnished complete for the entire array. Dead load, live load and wind load reactions, resulting from design loads are shown in Figures 2 and 3.

Anchor bolts are not furnished, since structures on which arrays are mounted vary with each installation. Anchor bolts must be designed for loads given. REF DWG. 01-05-123

Manifolds: All fluid manifolds are type "M" copper and connect each collector panel together. They are contained in the manifold strut which acts as a structural member as well as a weather tight housing to protect the insulation. These manifolds are completely assembled and insulated with $1 \frac{1}{2}''$ to 2" of fiberglass having a "k" factor 0.30 at 200°F .

Expansion Compensation: Expansion in the manifold is compensated by flexible swivel connection in each manifold support to allow all differential expansion between copper lines and steel housing to be distributed to East and West ends of the array. Flexible expansion compensator as depicted in Figure 1 are field supplies and installed to compensate for this movement with system piping.

Tracking System: System is designed for east-west tracking, with axis of collectors mounted parallel to polar axis. Collector panels are linked together with a system of heavy, galvanized aircraft cable and pulleys. This system is driven by a mechanism consisting of a two directional motor, chain drive, stainless steel (Acme) screw and a "Delvin" drive nut which does not require lubrication. The two directional motor is controlled by photovoltaic cells through an integrated circuit to constantly maintain collector panels in focus on the sun. In this circuit is a low light level which directs the collector to track to East during night time, and stop at the proper position for sunrise. Tracking angle is set for four hours before and four hours after solar noon which is the optimum for non-shading between collector panels.

APPLICATION: These series of collectors are applicable to any system requiring fluid temperatures up to 240°. Water or a combination of water and ethylene glycol is recommended as the heat transfer fluid. (See Paragraph on Freeze Protection) Other solutions may be used, provided they are compatible with copper, ethylene propylene rubber, neoprene rubber and silicone rubber which are used in components of fluid system in the collector arrays.

These arrays are installed with the long axis of the lenses pointing to true north and tilted to face south at an angle to horizon (tilt angle) equal to the north latitude. In this manner the rotation for east-west tracking is always parallel to the polar axis of the earth.

Arrays are available with a minimum of two collector panels and a maximum of eleven collector panels in one array. When more than eleven panels are required (473 ft² net aperture), additional arrays are used, and installed with the same 10'-0" spacing between panels, but without connecting manifolds between arrays.

Standard models are available with tilt angles ranging from 10° to 55° in 5° increments. Other tilt angles between these are available on special order and a slight increase in price.



MODEL NUMBERS: Arrays are ordered by model numbers and coding is explained as follows:

NSC-01-0000

Northrup Solar
Collector

Tilt Angle as indicated by last two digits of Model No.

"ML": Series

Number of Collector Panels in the Array

EXAMPLE: Model No. NSC-01-0732

"ML" Series

Seven Collector Panels

32° Tilt Angle

7 x 43 = 301 Net. Sq. Ft. in the array

MANIFOLD SIZES: Manifold sizes are arranged in a reverse return, with inlet to array at the southwest end and outlet at the northeast end. Sizes are as follows for south manifold starting from the east and are in reverse order for north manifold:

<u>MODEL NO.</u>	<u>(EAST) MANIFOLD SIZES (10'-0" LONG) (WEST)</u>
NSC-01-0200	1-3/4"
NSC-01-0300	2-3/4"
NSC-01-0400	2-3/4", 1-1"
NSC-01-0500	2-3/4", 2-1"
NSC-01-0600	2-3/4", 2-1", 1-1 1/4"
NSC-01-0700	2-3/4", 2-1", 2-1 1/4"
NSC-01-0800	2-3/4", 2-1", 2-1 1/4", 1-1 1/2"
NSC-01-0900	2-3/4", 2-1", 2-1 1/4", 2-1 1/2"
NSC-01-1000	2-3/4", 2-1", 2-1 1/4", 2-1 1/2", 1-2"

FLOW RATE: Recommended flow rate through each collector panel is 1.72 to 1.3 GPM. Figure 5 is actual pressure drop test through one collector panel at various flows. Pressure drop through manifolds can be determined by ASRAE standards. Manifold sizes listed above are selected to produce a pressure drop of not more than 3' head of water for 100'-0" equivalent feet of pipe @ 1.72 GPM per collector panel. Where manifolds change size every 10'-0", a reducing tee connects these pipes, with a 1/2" connection to flexible swivel of the collector panel.

FREEZE PROTECTION: This series of collectors are such that when system is drained, a small amount of fluid will be retained in the south absorber tube risers and in the south flexible swivel connections. Therefore a complete drain-down anti-freeze system is not applicable. In areas of infrequent days of freezing, warm water of the system may be circulated by means of an automatic low temperature sensor controlling pump of system during non-solar hours and/or below freezing periods.

In areas of frequent freezing periods an anti-freeze solution is required. Ethylene glycol is recommended for protection at various temperatures as follows:

<u>TEMP ° F</u>	<u>8 ETHYLENE GLYCOL</u>
16	20
10	25
0	33
-12	40
-34	50
-62	60

Each collector panel has a total volume of 3 gallons. Volume of each 10'-0" copper manifold is as follows:

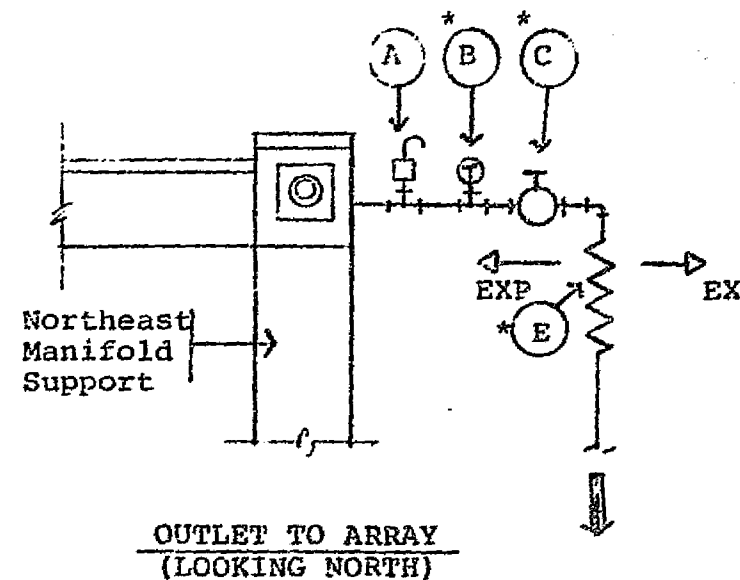
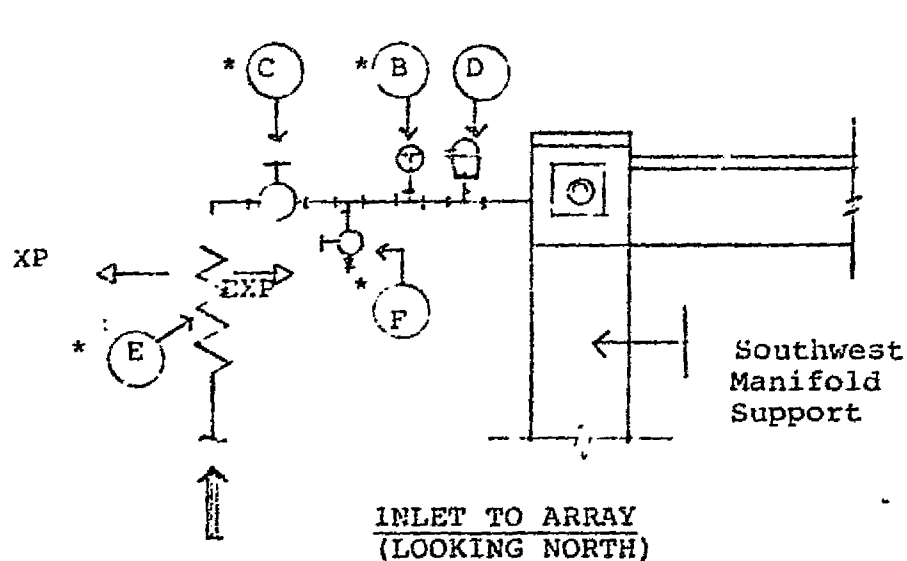
<u>MANIFOLD SIZE</u>	<u>GALS PER 10'-0" LENGTH</u>
3/4"	0.27
1"	0.46
1 1/4"	0.68
1 1/2"	0.95
2"	1.65

PIPING & FLUID SYSTEM: The following recommendations are made in the interest of providing viable system compatible with these systems.

Filtration: A strainer or filter is recommended ahead of the pump of the system to maintain system free of debris. This should be maintained frequently at start-up of system.

Valves and Controls: Figure 1 represents optimum of control valves and sensing devices. These arrays are designed for an operating pressure of 100 PSI at 240°F, with mechanical pressure relief at 125 PSI. Shut-off and balancing valves provide means to control the flow and to isolated array during repair. Temperature and pressure sensing wells provide means of balancing flow rate when more than one array is used. Drain valve provides a convenient method to make repairs to the array without affecting other system piping. An optional high limit control is available to defocus the collectors should temperature limit be exceeded.

SYSTEM TEMPERATURE CONTROL: Since function or application varies with each installation, temperature controls must be individually designed. It is recommended the manufacturer be consulted for recommendations regarding these controls.



SYMBOLS

- (A) Automatic air eliminator, furnished by manufacturer.
- * (B) Combination pressure and temperature measurement device. "Petes Plug" or equal.
- * (C) Combination balancing and shut-off valve. Ball valve recommended.
- (D) Pressure relief valve, furnished by manufacturer.
- * (E) Flexible connection to provide East-West expansion of array piping, $\pm 0.1"$ per 10'-0" of manifold piping.
- * (F) Drain cock with hose bibb connection.

*Not supplied by manufacturer

RECOMMENDED PIPING ACCESSORIES TO COLLECTOR PANEL ARRAY

Fig. 1

LOADS & REACTIONS:

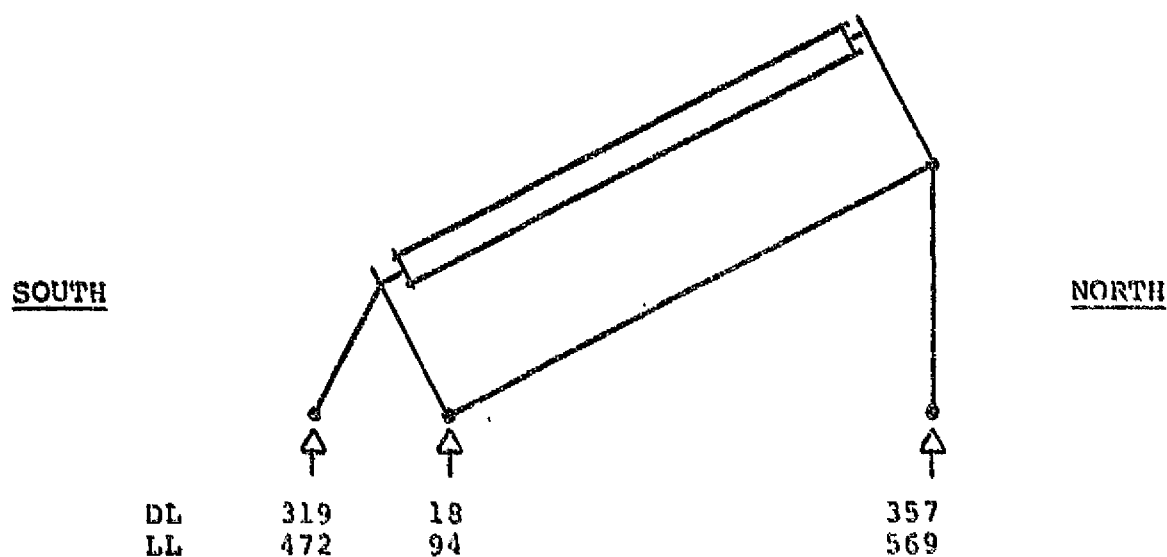
DESIGN LOADS

D. L. = Actual operating dead weight of structure including water as the fluid.

L. L. = One inch of ice on all surfaces of each member, 4.67 lbs/S.F. of member surface.

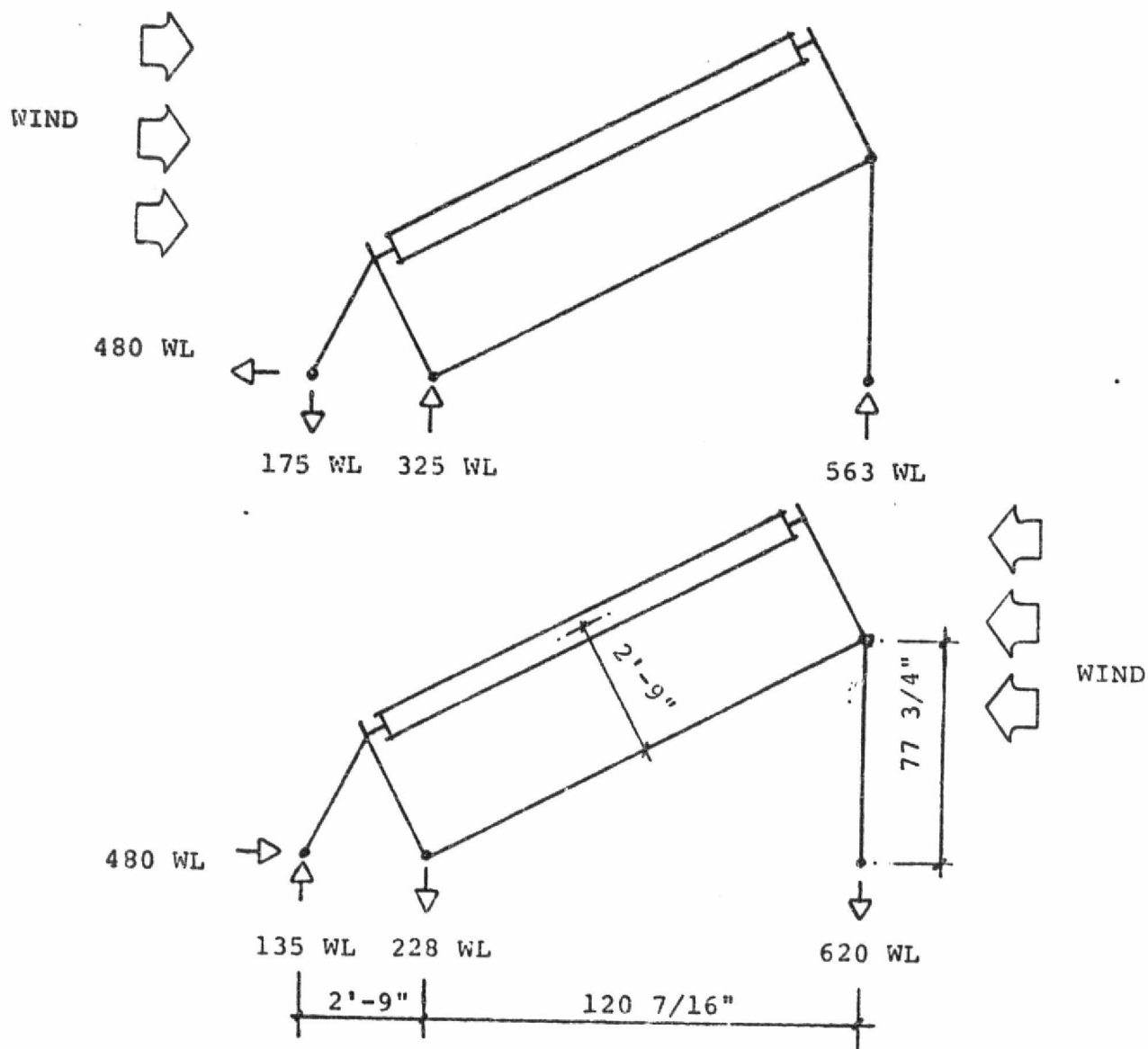
W. L. = 70 mph wind, at 30' above ground surface.

REACTIONS(lbs, at every 10'-0" O. C. in East-West direction)



MODEL NSC-01-0732

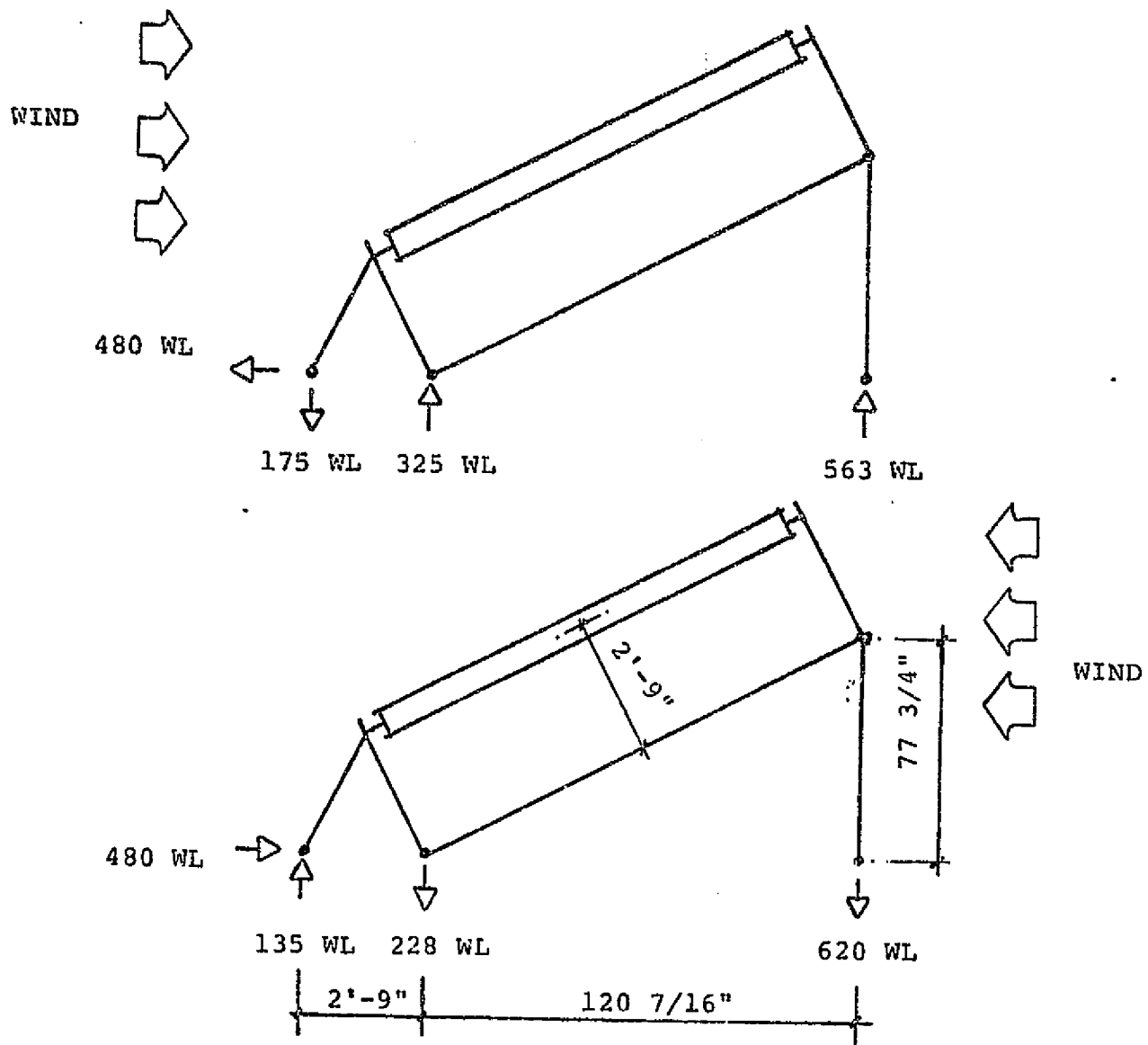
Fig. 2



MODEL NSC-01-0732

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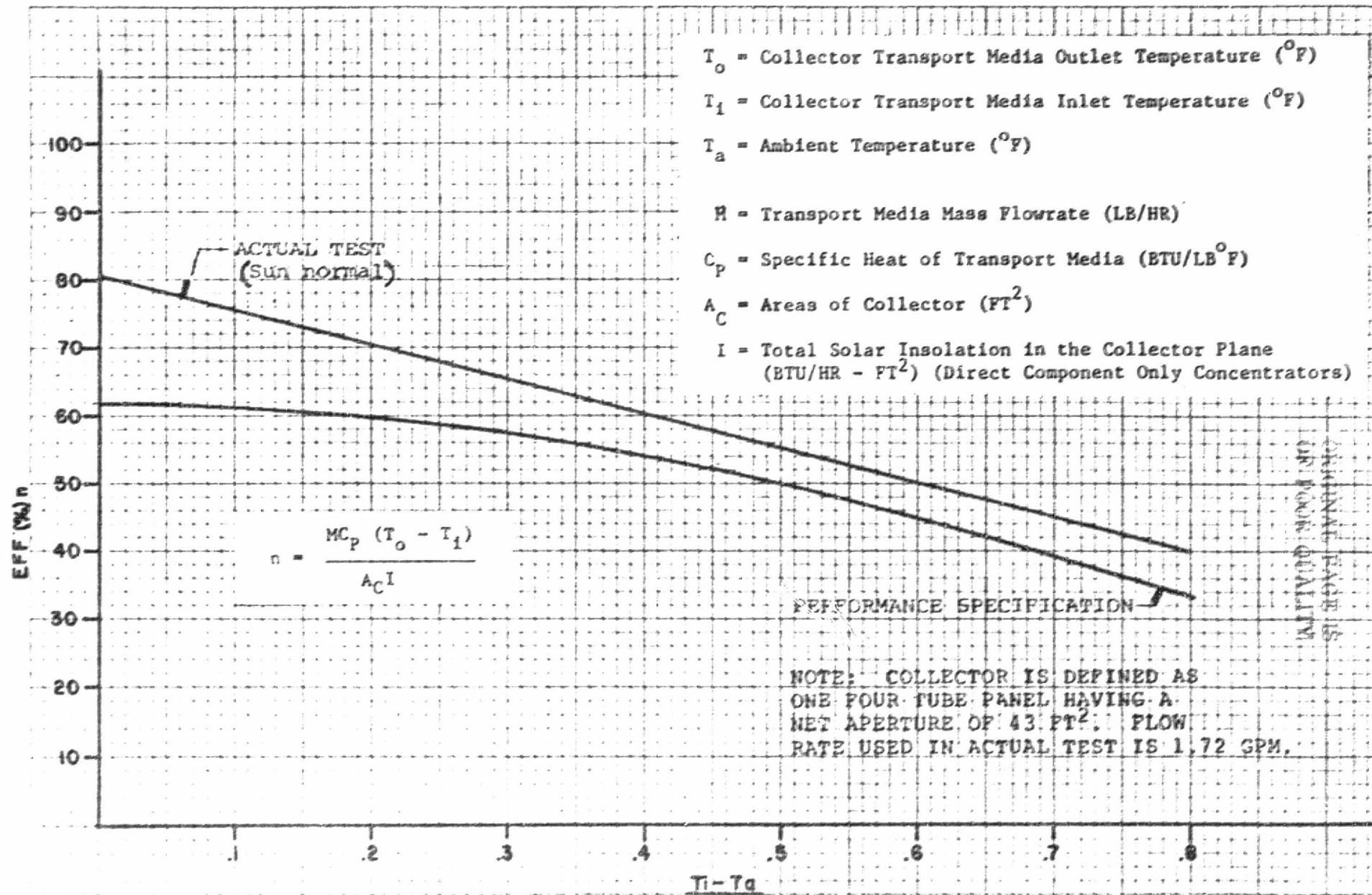
Fig. 3



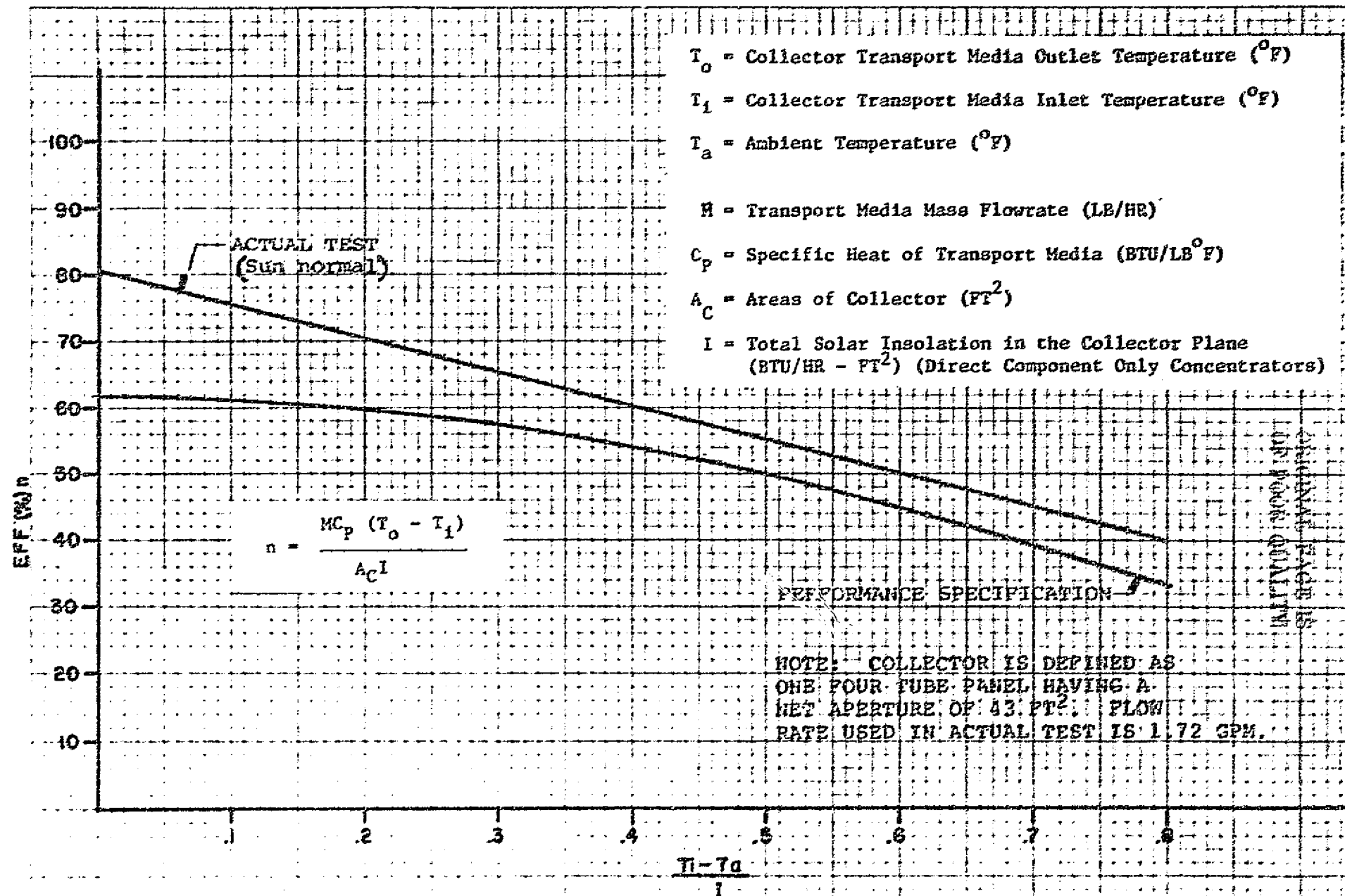
MODEL NSC-01-0732

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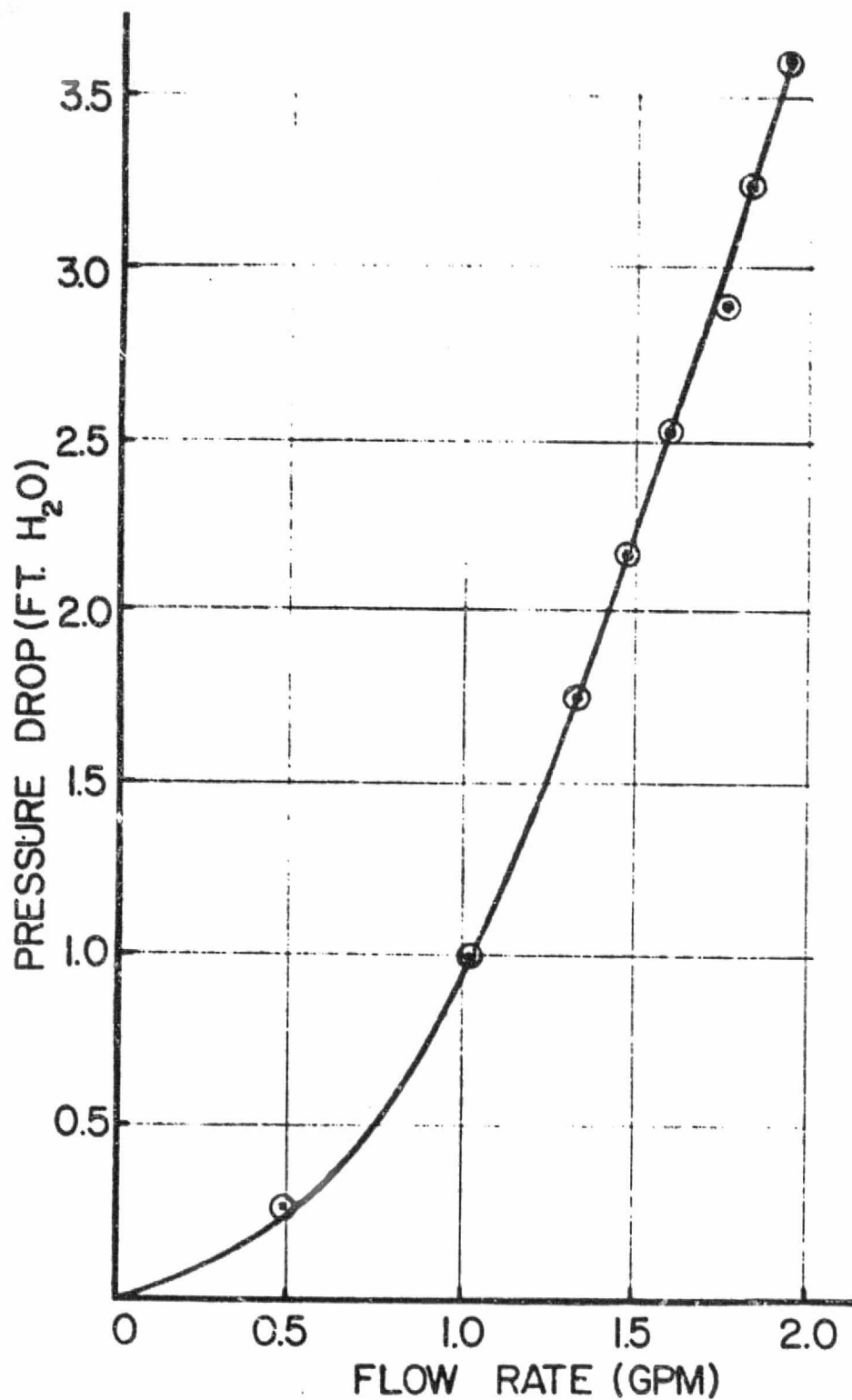
Fig. 3



PERFORMANCE CURVE- NORTHROP MOD. NSC-01-0732



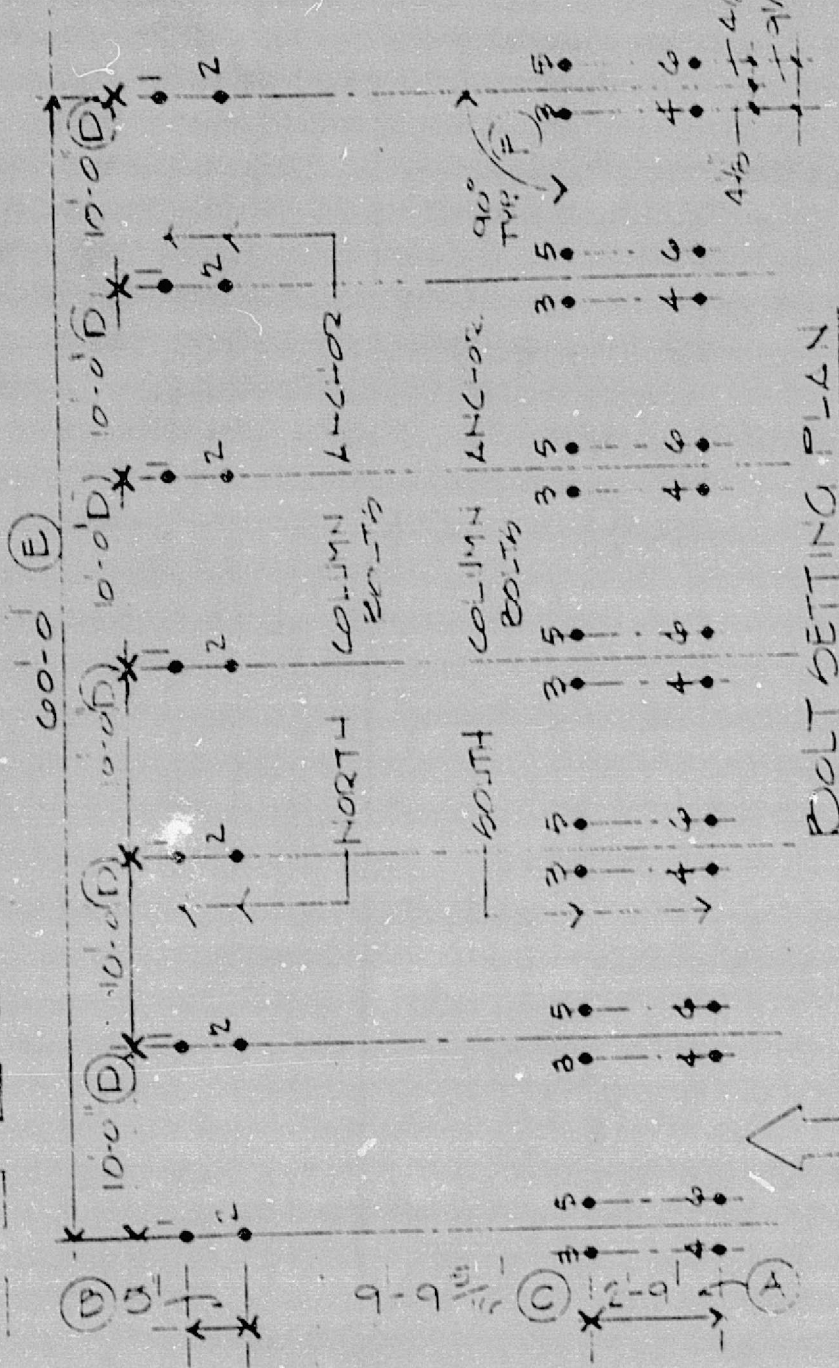
PERFORMANCE CURVE- NORTHROP MOD. NSC-01-0732



PRESSURE DROP THRU ONE, NORTHRUP
CONCENTRATING SOLAR COLLECTOR
PANEL (43 FT.² NET APERTURE)
MF-NSC-P-'ML' SERIES
(ONE PANEL CONSISTING OF 4 LENS
AND 4 ABSORBER TUBES)

FIGURE 5

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BOLT SETTING PLAN

TRUE NORTH
NOT MAGNETIC

ME-NHC-P 'ML' SERIES MODEL NHC-01-0732

PERMISSIBLE VARIATIONS FROM CENTER LINE
DIMENSIONS OF BOLT SETTING PLAN.

PERMISSIBLE VARIATIONS IN COLUMN SETTING
POINTS FROM ONE EYE-POINT.

* (A)	± 1/32"	ALONG N-S & BETWEEN BOLTS 1 & 2	± 1/32
* (B)	± 1/32"	ALONG E-W & BETWEEN TWO SETS OF ADJACENT BOLTS 1 & 2	± 1/4
(C)	± 1/2"	ALONG N-S & BETWEEN BOLTS 3 & 4	± 1/16
(D)	± 1/2"	ALONG N-S & BETWEEN BOLTS 5 & 6	± 1/16
(E)	± 1/2"	ALONG E-W & BETWEEN BOLTS 3 & 5	± 1/32
(F)	± 1/2 DEGREE	ALONG E-W & BETWEEN BOLTS 4 & 6	± 1/32
(G)	± 1/32"	ALONG E-W & BETWEEN ANY TWO SETS OF ADJACENT BOLTS 3 & 5 OR 4 & 6	± 1/4

SHOWN ON DRAWING 1/2 DIA. ANCHOR BOLTS

NORTHROP CORPORATION

NORTHROP, INCORPORATED 222 AVENUE D, HUNTSVILLE, TENNESSEE 37401

BOLT
SETTING PLAN
MODEL NHC-01-0732

01-05-123



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SUBSYSTEM PERFORMANCE SPECIFICATION

Northrup, Incorporated
Concentrating Collector

Basic Issue 10/1/76
CCBD 301-76-0047

Revision 1 1/20/77
CCBD 301-77-0209

Revision 2 7/14/78
CCBD 301-78-0354

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SUBSYSTEM PERFORMANCE SPECIFICATION

1.0 INTRODUCTION

"This Performance Specification establishes the requirements for the design and performance of the subsystems for use with combined heating and cooling systems. It designates the Interim Performance Criteria applicable to each type subsystem and defines the deviations. The appendices specify the performance for each subsystem."

2.0 APPLICABLE DOCUMENT

2.1 Government Documents

Interim Performance Criteria for Solar Heating and Combined Heating Cooling Systems and Dwellings, January 1, 1975. U.S. Department of Housing and Urban Development.

Interim Performance Criteria for Commercial Solar Housing and Combined Heating/Cooling Systems and Facilities, Document No. 98M10001, Revision Basic, dated February 28, 1975. George C. Marshall Space Flight Center, National Aeronautics and Space Administration.

2.2 Contractor Documents

2.2.a. Application Manual for Northrup Concentrating Solar Panels MF-NSC-P "ML" Series Model NSC-01-0732.

2.2.b. Installation Instructions for Northrup Concentrating Collector Panels with Integral Manifold - Frame and Sub-Frames, MF-NSC-P "MF" Series Model NSC-01-0732, Northrup, Inc.

3.0 APPLICATION OF INTERIM PERFORMANCE CRITERIA BY TYPE OF SUBSYSTEM

"The application of each paragraph of the Interim Performance Criteria to each type subsystem is provided in the following table(s).

Table I - Residential Subsystems

Table II - Commercial Subsystems

4.0 DEVIATIONS FROM INTERIM PERFORMANCE CRITERIA

4.1 None

5.0 GOVERNMENT FURNISHED PROPERTY

5.1 None

6.0 GOVERNMENT DIRECTED REQUIREMENTS

No specific requirements have been directed by the Contracting Officer.

7.0 SUBSYSTEM APPENDICES

Appendix A Subsystem Identification

Specification
Revision
Date

SHC-3048

2

7/14/78

8.0 WARRANTY

Eighteen months from date of shipment under normal usage. Materials and workmanship.

TABLE I

RESIDENTIAL SUBSYSTEMS. INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 1 OF 6

SUBSYSTEM APPLICATION				TYPE SYSTEMS			
A - APPLICABLE TO TYPE SYSTEMS INDICATED				H - HEATING			
NA - NOT APPLICABLE				HC - HEATING AND COOLING			
				HW - HOT WATER			
RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
1.1 H and HC Performance		NA		1.3.1 Collector Efficiency		A	
1.1.1 Heating Design Temperatures		NA		1.4 Thermal Storage		NA	
1.1.2 Cooling Design Temperatures		NA		1.4.1 Storage Capacity		NA	
1.1.3 Relative Humid- ity and Water Vapor Pressure		NA		1.5 Habitability of Occupied Spaces		NA	
1.1.4 Solar Contribution		NA		1.5.1 Heat or Humidity Transfer Effects		NA	
1.1.5 Operation Impairment		NA		1.6 Energy Transport Efficiency		NA	
1.2 HW System/Sub- system Performance		NA		1.6.1 Thermal Losses and Electrical Power		NA	
1.2.1 Water Design Temperature		NA		1.7 Control		NA	
1.2.2 Storage Design Capacity		NA		1.7.1 Installation and Maintenance		NA	
1.2.3 Solar Contribution		NA		1.7.2 Manual Adjustment		NA	
1.2.4 Operational Impairment		A		1.7.3 Inhabited Space Temperature		NA	
1.3 Collector Performance		A		1.7.4 Hot Water Temper- ature		NA	
				1.8 Auxiliary Energy		NA	
				1.8.1 Design Loads		NA	

TABLE I

SPECIFICATION NO. _____

REVISION 2

DATE 7/14/78

RESIDENTIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 2 of 6

SUBSYSTEM APPLICATION

A - APPLICABLE TO TYPE SYSTEMS INDICATED

NA - NOT APPLICABLE

TYPE SYSTEMS

H - HEATING

HC - HEATING AND COOLING

HW - HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
2.1 System Design Conditions		A		2.3.1 Pressure Test: Nonpotable Fluids		A	
2.1.1 Equipment Capabilities		A		2.3.2 Pressure Test: Potable Water		A	
2.1.2 Noise or Erosion - Corrosion		A		2.3.3 Air Transport Systems		NA	
2.1.3 Operating Conditions		A		2.4 Collector Adjustment		A	
2.1.4 Fluid Flow in Collectors		A		2.4.1 Orientation and Tilt		A	
2.1.5 Entrapped Air		A		2.4.2 Mutual Shadowing		A	
2.1.6 Thermal Expansion of Fluids		A		2.5 Subsystem Isolation		NA	
2.1.7 Pressure Drops		A		2.5.1 Shutdown in Multi-family Housing		NA	
2.1.8 Condensate Removal		NA		2.6 Heat Transfer Fluid Quality		NA	
2.2 Mechanical Stresses		A		2.6.1 Liquid Quality		NA	
2.2.1 Vibration Stress Levels		A		2.6.2 Air Quality		NA	
2.2.2 Vibration from Moving Parts		A		2.6.3 Fluid Quality		NA	
2.2.3 Water Hammer		NA		2.6.4 Freezing Protection		NA	
2.2.4 Vacuum Relief Protection		A		2.7 Piping Supports		NA	
2.2.5 Thermal Changes		A		2.7.1 Applicable Plumbing Standards		A	
2.2.6 Flexible Joints		A		2.8 Excessive Pressure and Temperature Protection		A	
2.3 Leakage Prevention		A		2.8.1 Relief Valves and Vents		A	
				3.1 Structural Design Basis		A	

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TABLE 1

RESIDENTIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 2 OF 6

SUBSYSTEM APPLICATION				TYPE SYSTEMS			
A - APPLICABLE TO TYPE SYSTEMS INDICATED				H HEATING			
NA - NOT APPLICABLE				HC HEATING AND COOLING			
				HW - HOT WATER			
RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
3.1.1 Applicable Standards		A		3.8.1 Foundation Settlement		A	
3.1.2 Service Loads		A		3.9 Ponding Condition		A	
3.2 Failure Loads and Load Capacity		A		3.9.1 Design Provisions		A	
3.2.1 Ultimate Load Combinations		A		4.1 Plumbing and Electrical Installation		A	
3.2.2 Ice Loads		A		4.1.1 Plumbing Codes		A	
3.2.3 Vehicular Loads		NA		4.1.2 Electrical Codes		A	
3.2.4 Load Capacity		A		4.2 Fail-Safe Controls		A	
3.3 Damage Control		A		4.2.1 System Failure Prevention		A	
3.3.1 Resistance to Damage		A		4.2.2 Automatic Pressure Relief Valves		A	
3.3.2 Glazing Design		A		4.3 Fire Safety		A	
3.4 Cyclic Loads		A		4.3.1 Applicable Fire Standards		A	
3.4.1 Deflection Limitations		A		4.3.2 Penetrations through Fire Rated Assemblies		NA	
3.5 Cutting of Structural Elements		NA		4.4 Toxic		NA	
3.5.1 Design Provisions		NA		4.4.1 Provisions of Catch Basins		NA	
3.6 Creep and Residual Deflection		NA		4.4.2 Detection of Toxic and Flammable Fluids		NA	
3.6.1 Deflection Limitations		NA		4.5 Safety		A	
3.7 Hail Resistance		A		4.5.1 Emergency Egress and Access		NA	
3.7.1 Hail Size and Loading		A		4.5.2 Identification and Location of Controls		A	
3.8 Constraint Loads		A					

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RESIDENTIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

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SUBSYSTEM APPLICATION

A APPLICABLE TO TYPE SYSTEMS INDICATED

NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC HEATING AND COOLING

HW HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
4.6 Protection of Duct- able Water & Circulated Air		A		5.2.3 Thermal Cycling Stresses		A	
4.6.1 Contamination by Materials		A		5.2.4 Leakage		A	
4.6.2 Separation of Circulation Loops		NA		5.2.5 Deterioration of Gaskets and Sealants		A	
4.6.3 Backflow Prevention		NA		5.2.6 Transmission Loss- es Due to Outgassing		A	
4.6.4 Growth of Fungi		A		5.3 Chemical Compati- bility of Components		A	
4.7 Excessive Sur- face Temperatures		A		5.3.1 Materials/Transfer Fluid Compatibility		A	
4.7.1 Protection from Heated Components		A		5.3.2 Corrosion of Dis- similar Materials		A	
5.1 Effects of Ex- ternal Environment		A		5.3.3 Corrosion by Leach- able Substance		A	
5.1.1 Solar Degradation		A		5.3.4 Effects of Decom- position Products		A	
5.1.2 Soil Corrosion		NA		5.4 Components Involv- ing Moving Parts		A	
5.1.3 Airborne Pollutants		A		5.4.1 Wear and Fatigue		A	
5.1.4 Dirt Retention on Cover Plate Surface		A		6.1 Accessibility for Maintenance		A	
5.1.5 Abrasive Wear		A		6.1.1 Access for System Maintenance		A	
5.1.6 Fluttering by Wind		A		6.1.2 Access for System Monitoring		A	
5.2 Temperature & Pressure Resistance		A		6.1.3 Draining and Filling of Liquids		A	
5.2.1 Thermal De- gradation		A		6.1.4 Flushing of Liquids Subsystems		A	
5.2.2 Deterioration of Heat Transfer Fluids		A					

TABLE 1

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RESIDENTIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

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SUBSYSTEM APPLICATION

A APPLICABLE TO TYPE SYSTEMS INDICATED

NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC HEATING AND COOLING

HW HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
4.6 Protection of Distributable Water & Circulated Air		A		5.2.3 Thermal Cycling Stresses		A	
4.6.1 Contamination by Materials		A		5.2.4 Leakage		A	
4.6.2 Separation of Circulation Loops		NA		5.2.5 Deterioration of Gaskets and Sealants		A	
4.6.3 Backflow Prevention		NA		5.2.6 Transmission Losses Due to Outgassing		A	
4.6.4 Growth of Fungi		A		5.3 Chemical Compatibility of Components		A	
4.7 Excessive Surface Temperatures		A		5.3.1 Materials/Transfer Fluid Compatibility		A	
4.7.1 Protection from Heated Components		A		5.3.2 Corrosion of Dissimilar Materials		A	
5.1 Effects of External Environment		A		5.3.3 Corrosion by Leachable Substance		A	
5.1.1 Solar Degradation		A		5.1.4 Effects of Decomposition Products		A	
5.1.2 Soil Corrosion		NA		5.4 Components Involving Moving Parts		A	
5.1.3 Airborne Pollutants		A		5.4.1 Wear and Fatigue		A	
5.1.4 Dirt Retention on Cover Plate Surface		A		6.1 Accessibility for Maintenance		A	
5.1.5 Abrasive Wear		A		6.1.1 Access for System Maintenance		A	
5.1.6 Fluttering by Wind		A		6.1.2 Access for System Monitoring		A	
5.2 Temperature & Pressure Resistance		A		6.1.3 Draining and Filling of Liquids		A	
5.2.1 Thermal Degradation		A		6.1.4 Flushing of Liquids Subsystems		A	
5.2.2 Deterioration of Heat Transfer Fluids		A					

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TABLE I

RESIDENTIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 5 OF 6

SUBSYSTEM APPLICATION

A - APPLICABLE TO TYPE SYSTEMS INDICATED

NA - NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC - HEATING AND COOLING

HW - HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
6.1.5 Filters		NA		7.2.2 Storage Area		NA	
6.1.6 Potable Water Shutoff		NA		7.2.3 Utility Chases		NA	
6.2 Installation, Operation and Maintenance Manual		A		7.3 Functioning of Dwelling Site		NA	
6.2.1 Installation Instructions		A		7.3.1 Space Use		NA	
6.2.2 Maintenance and Operation Instructions		A		7.3.2 Shading of Adjacent Structures		NA	
6.2.3 Maintenance Plan		A		7.3.3 Impact of Environment		NA	
6.2.4 Replacement Parts		A		7.3.4 View		NA	
6.3 Repair and Service Personnel		A		8.1 Interference with Mechanical Operation		NA	
6.3.1 Maintenance of H and HC Systems		NA		8.1.1 Blockage of Solar Subsystem		NA	
6.3.2 Maintenance of DHW System		NA		8.1.2 Shading of Collector		NA	
7.1 Design		NA		8.1.3 Sensor Location		NA	
7.1.1 Dwelling Design		NA		8.2 Mechanical & Electrical Functioning of Dwelling and Site		NA	
7.1.2 Mobile Home Design		NA		8.2.1 Exhaust and Venting		NA	
7.1.3 Site Design		NA		8.2.2 Utilities		NA	
7.1.4 Passive Use of Solar Energy		NA		8.3 Mechanical & Electrical Functioning of Connections		NA	
7.2 Adequate Space		NA		8.3.1 Plumbing Connections		NA	
7.2.1 Collector Area		NA					

TABLE I

RESIDENTIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 6 OF 6

SUBSYSTEM APPLICATION

A APPLICABLE TO TYPE SYSTEMS INDICATED

NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC HEATING AND COOLING

HW HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
8.1.2 Electrical Connections		NA		11.2.2 Heat and Moisture		A	
9.1 Structural Integrity		NA		11.2.3 Exterior Penetration		NA	
9.1.1 Movements in Adjacent Structures		NA		11.3 Durability and Reliability of Connections		NA	
9.2 Structural Integrity of Dwelling		NA		11.3.1 Material Compatibility		A	
9.2.1 Loads		NA		12.1 Maintainability of H, HC, HW Systems		NA	
9.2.2 Penetration of Structural Members		NA		12.1.1 Accessibility		NA	
9.3 Structural Connections		NA		12.1.2 Misuse		NA	
9.3.1 Structural Connections		NA		12.1.3 Permanent Maintenance Accessories		NA	
9.3.2 Brittle Subsystem		NA		12.2 Maintainability of Dwelling and Site		NA	
9.3.3 Strength and Safety of Dwelling and Site		NA		12.2.1 Accessibility		NA	
10.1.1 Fire		NA		12.2.2 Ice Dams		NA	
10.1.2 Accidents		NA		12.3 Connections		NA	
11.1 Durability		NA		12.3.1 Accessibility		NA	
11.1.1 Vegetation		NA		13.1 Visual Characteristics of Dwelling and Site		NA	
11.2 Durability and Reliability of Dwelling and Site		NA		13.1.1 Dwelling		NA	
11.2.1 Chemical Corrosion		A		13.1.2 Neighborhood		NA	

TABLE II

COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 1 OF 6

APPLICATION

A - APPLICABLE TO SYSTEMS INDICATED
NA - NOT APPLICABLE

TYPE SYSTEMS

H HEATING
HC - HEATING AND COOLING
HW - HOT WATER

COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
1.1 H and HC System Performance		NA		1.6 Energy Transport		NA	
1.1.1 Heating Design Temperature		NA		1.6.1 Thermal Losses and Electrical Power		NA	
1.1.2 Cooling Design Temperature		NA		1.7 Control		NA	
1.1.3 Relative Humidity		NA		1.7.1 Installation and Maintenance		NA	
1.1.4 Solar Contrib- ution		NA		1.7.2 Manual Adjustment		NA	
1.2 HW System/Sub- system Performance		NA		1.7.3 Inhabited Space Temperature Control		NA	
1.2.1 Draw and Tem- perature Design Output		NA		1.7.4 Hot Water Tempera- ture		NA	
1.2.2 Non-Tap Temp- erature Design Output		NA		1.8 Auxiliary Energy		NA	
1.2.3 Solar Contribution		NA		1.8.1 Design Heat Loads		NA	
1.3 Collector Performance		A		1.8.2 Design Cooling Loads		NA	
1.3.1 Collector Efficiency		A		1.8.3 Impairment of Oper- ation		NA	
1.4 Thermal Storage Performance		NA		2.1 System Design Conditions		A	
1.4.1 Storage Capacity and Rate		NA		2.1.1 Equipment Capabilities		A	
1.5 Habitability of Occupied Spaces		NA		2.1.2 Noise or Erosion- Corrosion		A	
1.5.1 Heat or Humidity Transfer Effects		NA		2.1.3 Operating Conditions		A	
				2.1.4 Fluid Flow in Collectors		A	
				2.1.5 Entrapped Air		A	
				2.1.6 Thermal Expan- sion of Fluids		A	
				2.1.7 Pressure Drops		A	

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COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 2 OF 6

APPLICATION

A - APPLICABLE TO SYSTEMS INDICATED

NA - NOT APPLICABLE

TYPE SYSTEMS

H - HEATING

HC - HEATING AND COOLING

HW - HOT WATER

COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
2.1.8 Condensate Removal		NA		2.6.2 Air Quality		NA	
2.2 Mechanical Stresses		A		2.6.3 Fluid Treatment		NA	
2.2.1 Vibration Stress Levels		A		2.6.4 Freezing Protection		NA	
2.2.2 Vibration from Moving Parts		A		2.7 Piping Supports		NA	
2.2.3 Water Hammer		NA		2.7.1 Applicable Plumbing Standards		A	
2.2.4 Vacuum Relief Protection		A		2.8 Excessive Pressure and Temperature Pro- tection		A	
2.2.5 Thermal Changes		A		2.8.1 Relief Valves and Vents		A	
2.2.6 Flexible Joints		A		3.1 Structural Design Basis		A	
2.3 Leakage Pre- vention		A		3.1.1 Service Loads		A	
2.3.1 Pressure Test: Non-Potable Fluids		A		3.2 Failure Loads and Load Capacity		A	
2.3.2 Pressure Test: Potable Water		A		3.2.1 Ultimate Load Combinations		A	
2.3.3 Air Transport System		NA		3.2.2 Ice Loads		A	
2.4 Collector Adjustments		A		3.2.3 Vehicular Loads		NA	
2.4.1 Orientation and Tilt		A		3.2.4 Load Capacity		A	
2.4.2 Mutual Shadowing		A		3.3 Damage Control		A	
2.5 Subsystem Isola- tion		NA		3.3.1 Resistance to Damage		A	
2.5.1 Shutdown in Multi-unit Facilities		NA		3.4 Cyclic Loads		A	
2.6 Heat Transfer Fluid Quality		NA		3.4.1 Deflection Limitations		A	
				3.5 Cutting of Structural Elements		NA	
				3.5.1 Design Provisions		NA	

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TABLE II

COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY							
APPLICATION				TYPE SYSTEMS			
A APPLICABLE TO SYSTEMS INDICATED				H HEATING			
NA NOT APPLICABLE				HC HEATING AND COOLING			
				HW HOT WATER			
COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
3.6 Creep and Residual Deflection		NA		4.3.2 Penetrations Through Fire-Rated Assemblies		NA	
3.6.1 Deflection Limitations		NA		4.4 Toxic and Flamm- able Fluids		NA	
3.7 Nail Resistance		A		4.4.1 Provision of Catch Basins		NA	
3.7.1 Nail Size and Loading		A		4.4.2 Detection of Toxic and Flammable Fluids		NA	
3.8 Constraint Loads		A		4.5 Safety Under Emergency Conditions		NA	
3.8.1 Foundation Settlement		NA		4.5.1 Emergency Egress and Access		NA	
3.9 Ponding Condi- tions		A		4.5.2 Identification and Location of Controls		A	
3.9.1 Design Provi- sions		A		4.6 Protection of Water and Circulated Air		A	
4.1 Plumbing and Electrical Installation		A		4.6.1 Contamination by Materials		A	
4.1.1 Plumbing Codes and Standards		A		4.6.2 Separation of Circulation Loops		NA	
4.1.2 Electrical Codes and Standards		A		4.6.3 Backflow Prevention		NA	
4.2 Fail-Safe Controls		A		4.6.4 Growth of Fungi		A	
4.2.1 System Failure Prevention		A		4.7 Excessive Surface Temperature		A	
4.2.2 Automatic Pres- sure Relief Valves		A		4.7.1 Protection from Heated Components		A	
4.3 Fire Safety		A		5.1 Effects of External Environment		A	
4.3.1 Applic. to Fire Standards		A		5.1.1 Solar Degradation		A	
				5.1.2 Soil Corrosion		NA	
				5.1.3 Airborne Pollutants		A	

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COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

APPLICATION

A APPLICABLE TO SYSTEMS INDICATED

NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC HEATING AND COOLING

HW HOT WATER

COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
5.1.3 Dirt Retention on Cover Plate Surfaces		A		5.4 Components Involving Moving Parts		A	
5.1.5 Abrasive Wear		A		5.4.1 Wear and Fatigue		A	
5.1.6 Fluttering by Wind		A		6.1 Accessibility for Maintenance and Servicing		A	
5.2 Temperature and Pressure Resistance		A		6.1.1 Access for System Maintenance		A	
5.2.1 Thermal Degradation		A		6.1.2 Access for System Monitoring		A	
5.2.2 Deterioration of Heat Transfer Fluids		A		6.1.3 Draining and Filling of Liquids		A	
5.2.3 Thermal Cycling Stresses		A		6.1.4 Flushing of Liquid Subsystems		A	
5.2.4 Leakage		A		6.1.5 Filters		NA	
5.2.5 Deterioration of Gaskets and Sealants		A		6.1.6 Water Shutoff		NA	
5.2.6 Transmission of Losses Due to Out- gassing		A		6.2 Installation, Operation and Maintenance Manual		A	
5.3 Chemical Compa- tibility of Compon. .		A		6.2.1 Installation Instructions		A	
5.3.1 Materials/Trans- fer Fluid Compatibility		A		6.2.2 Maintenance and Oper- ating Instructions		A	
5.3.2 Corrosion of Dis- similar Materials		A		6.2.3 Maintenance Plan		A	
5.3.3 Corrosion by Leachable Substances		A		6.2.4 Replacement Parts		A	
5.3.4 Effects of Dece- position Products		A		6.3 Repair and Service Personnel		A	
				6.3.1 Servicing of H and HC Systems		A	
				6.3.2 Servicing of HW Systems		A	
				7.1 Design		NA	

TABLE II

COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 5 OF 6

APPLICATION

A APPLICABLE TO SYSTEMS INDICATED
NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING
HC HEATING AND COOLING
HW HOT WATER

COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
7.1.1 Design-Habit- able Facilities		NA		8.1.3 Sensor Location		NA	
7.1.2 Esthetics		NA		8.2 Mechanical and Elec- trical Functioning of Facility and Site		NA	
7.1.3 Materials				8.2.1 Exhaust and Venting		NA	
7.1.4 Passive Use of Solar Energy		NA		8.2.2 Utilities		NA	
7.2 Adequate Space		NA		8.3 Mechanical and Elec- trical Functioning of Connections		NA	
7.2.1 Solar Collector		NA		8.3.1 Plumbing Connections		NA	
7.2.2 Storage		NA		8.3.2 Electrical Connections		NA	
7.2.3 Interferen Bet- ween Facility and H and HC Systems				8.3.3 Lightning Protection		NA	
7.2.4 Portability		NA		9.1 Structural Integrity of H, HC and HW Systems		NA	
7.3 Functioning of Facilities and Sites		NA		9.1.1 Movement of Adjacent Structures		NA	
7.3.1 Space Use		NA		9.2 Structural Integrity of Facilities		NA	
7.3.2 Shading		NA		9.2.1 Loads		NA	
7.3.3 Impact on En- vironment		NA		9.2.2 Penetration of Struc- tural Members		NA	
7.3.4 View		NA		9.3 Structural Connections		NA	
7.4 Compatibility with Conventional Systems		NA		9.3.1 Structural Connections		NA	
7.4.1 Utility Compati- bility		NA		9.3.2 Brittle Components		NA	
8.1 Interference with Mechanical Operation		NA		9.3.3 Strength and Stiffness		NA	
8.1.1 Blockage of Solar Solar Components		NA		10.1 Safety of Facility and Site		NA	
8.1.2 Shading of Collec-		NA		10.1.1 Fire		NA	
				10.1.2 Accidents		NA	

TABLE II

COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 2 OF 6

APPLICATION

A APPLICABLE TO SYSTEMS INDICATED

NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC HEATING AND COOLING

HW HOT WATER

COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
11.1 Durability and Reliability of H, HC and HW Systems		NA		12.3.1 Accessibility		NA	
11.1.1 Vegetation		NA		13.1 Visual Characteristics of Facility and Site		NA	
11.2 Durability and Reliability of Facili- ties and Sites		NA		13.1.1 Facility		NA	
11.2.1 Chemical Corrosion		A		13.1.2 Neighborhood		NA	
11.2.2 Heat and Moisture		A					
11.2.3 Exterior Pene- trations		NA					
11.3 Durability and Reliability of Connec- tions		A					
11.3.1 Material Com- patibility		A					
12.1 Maintainability of H, HC and HW Systems		NA					
12.1.1 Accessibility		NA					
12.1.2 Misuse		NA					
12.1.3 Permanent Main- tenance Accessories		NA					
12.2 Maintainability of Facility and Site		NA					
12.2.1 Accessibility		NA					
12.2.2 Ice Dams		NA					
12.3 Connections		NA					

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Revision 2
Date 7/14/78

APPENDIX A

A SUBSYSTEM IDENTIFICATION

This Appendix defined the thermal performance for collector, Northrup, Inc. Subsystem Model NSC-01-0732, MF-NSC-P "MF" Series.

A-1 SOLAR COLLECTOR

For Dallas, Texas, the single solar collector will collect a minimum of 1144 BTU/Ft²/Day of energy at an inlet fluid temperature of 190°F (water). The tilt angle at this performance basis will be equal to the latitude angle, azimuth of 0 degrees, average ambient dry bulb 100°F, wind velocity zero, August 21 date, direct normal noon solar flux of 283 BTU/Hr Ft², longitude of 97° and 32° latitude.

When used primarily for heating, a single collector will provide 1242 BTU/Ft² Day at an inlet fluid temperature of 150°F (water). The tilt angle at this performance basis is equal to the latitude angle, azimuth of 0 degrees, average ambient 50°F, wind velocity zero, February 21 date, direct normal noon solar flux of 316 BTU/Hr Ft², longitude of 97° and 32° latitude.

*ASHRAE Handbook of Fundamentals, American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., 345 East 47th Street, New York, NY, 1972.

$\eta = \frac{A_c}{MC_p(T_o - T_i)}$
 T_o = COLLECTOR TRANSPORT MEDIA OUTLET TEMPERATURE ($^{\circ}F$)
 T_i = COLLECTOR TRANSPORT MEDIA INLET TEMPERATURE ($^{\circ}F$)
 T_a = AMBIENT TEMPERATURE ($^{\circ}F$)
 M = TRANSPORT MEDIA MASS FLOWRATE (LB/HR)
 C_p = SPECIFIC HEAT OF TRANSPORT MEDIA (BTU/LB $^{\circ}F$)
 A_c = AREA OF COLLECTOR (FT²)
 I = TOTAL SOLAR INSOLATION IN THE COLLECTOR PLANE (BTU/HR - FT²)
 (DIRECT COMPONENT ONLY CONCENTRATORS)

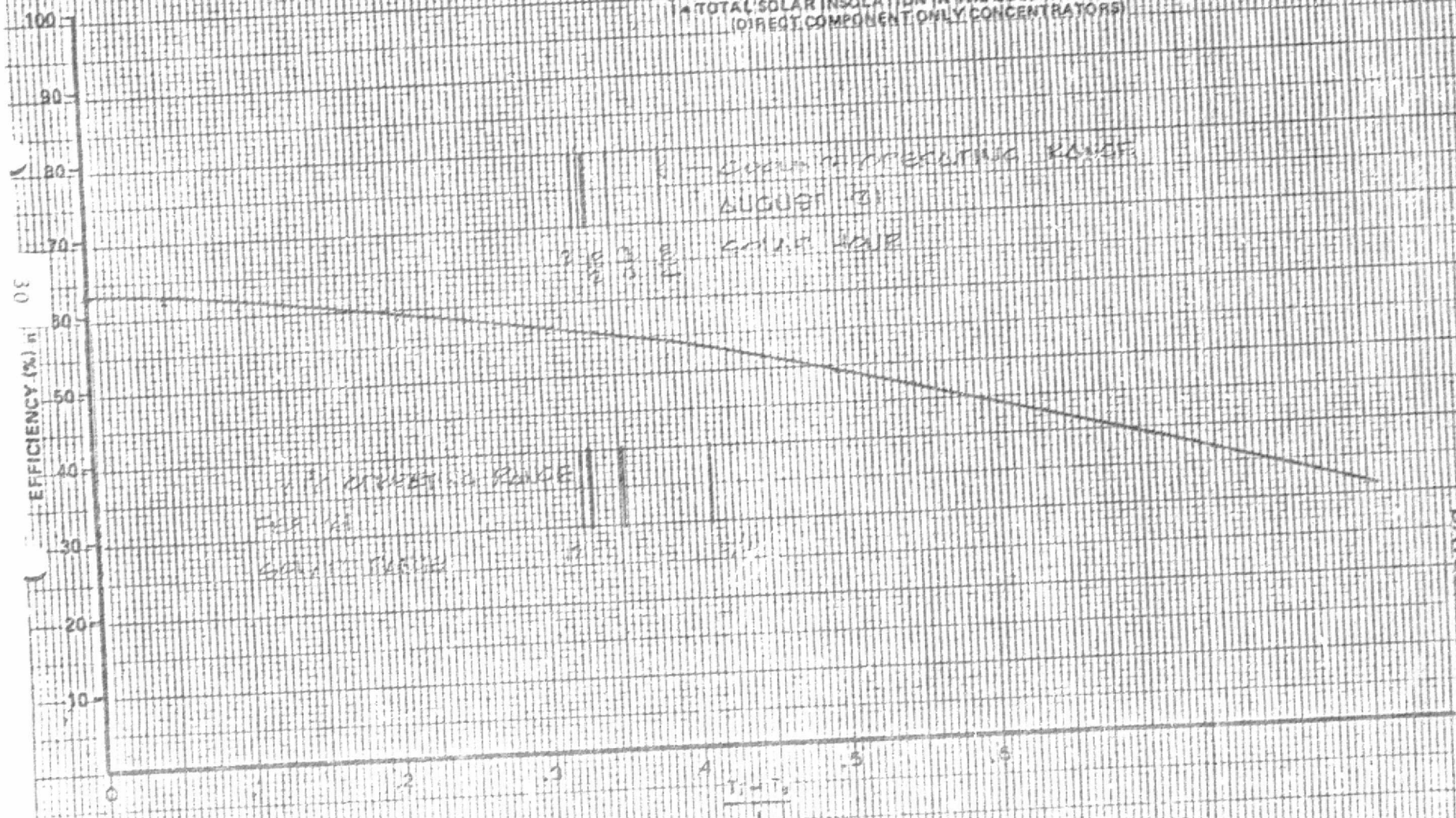


FIGURE 1 EFFICIENCY AS A FUNCTION OF OPERATING CONDITIONS
PERFORMANCE MUST BE ABOVE LINE

LIST OF MATERIALS

DATE: 1-16-76

NORTHROP CONCENTRATING SOLAR
COLLECTOR PANELS, MF-NSC-P "ML" SERIES

REV: B 1-16-78

NO. 01-05-076

MODEL NSC-01-0732

PAGE 1 OF 2

ITEM	QTY.	DRAWING OR PART NUMBER	DESCRIPTION
1	1✓	01-03-009	Tracking Control Box Assembly
4	7✓	01-04-004	Collector Panel Assembly
5	3✓	01-04-005	South Wind Bracing Assembly
6	3✓	01-04-006	Upper North Wind Bracing Assembly
7	7✓	01-04-007	Inclined Strut Assembly
8	1✓	01-04-008	Tracking Control Box Mount Assembly
9	2✓	01-04-009	Idler Pulley Mount Assembly
10	2✓	01-04-010	Manifold Strut Assembly 3/4" cu Manifold
11	2✓	01-04-011	Manifold Strut Assembly 3/4" cu Manifold
12	2✓	01-04-012	Manifold Strut Assembly 1" cu Manifold
13	2✓	01-04-013	Manifold Strut Assembly 1" cu Manifold
14	4✓	01-04-014	Manifold Strut Assembly 1 1/4" cu Manifold
19	2✓	01-03-002	South Manifold Support 3/4" x 3/4" connection
20	1✓	01-03-003	South Manifold Support 1" x 3/4" connection
21	1✓	01-03-004	South Manifold Support 1" x 1" connection
22	1✓	01-03-005	South Manifold Support 1 1/4" x 1" connection
23	2✓	01-03-006	South Manifold Support 1 1/4" x 1 1/4" connection
28	2✓	01-03-023	North Manifold Support (w/Bleeder) 3/4 x 3/4
29	1✓	01-03-024	North Manifold Support (w/Bleeder) 1 x 3/4
30	1✓	01-03-025	North Manifold Support (w/Bleeder) 1 x 1
31	1✓	01-03-026	North Manifold Support (w/Bleeder) 1 1/4 x 1
32	2✓	01-03-027	North Manifold Support (w/Bleeder) 1 1/4 x 1 1/4
37	6✓	01-04-024	North Wind Strut Assembly
A	7✓	01-03-032	North Column Assembly 32° Tilt Angle

LIST OF MATERIALS

DATE: 1-16-76

NORTHROP CONCENTRATING SOLAR
COLLECTOR PANELS, MF-NSC-P "ML" SERIES

REV: B 1-16-78

NO. 01-05-076

MODEL NSC-01-0732

PAGE 2 OF 2

ITEM	QTY.	DRAWING OR PART NUMBER	DESCRIPTION
B	3 ✓	01-04-035	Lower North Wind Bracing Assmb. 32° Tilt Angle
C	7 ✓	01-04-044	South Brace Assembly 32° Tilt Angle •
D	14 ✓	01-07-003	South Column Base Is
E	1	01-04-057	Fluid Inlet Assembly 1 1/4" Manifold
F	1	01-04-062	Fluid Outlet Assembly 1 1/4" Manifold
G	2	01-04-065	Manifold End Closure 3/4"
H	1	01-04-072	Cable Drive Assemble 7 Collector Panels
I	5 ft ³	01-13-003	Loose Fill Insulation (1 bag - 7.5 ft. ³)
J	1	01-04-077	Sensor Attachment Assembly

PARTS LIST

ORIGINAL PAGE IS
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INDEX

Products 01 = Solar Collector Panels "ML" Series

PART NUMBER	DESCRIPTION
01-01-000	Commodities (Steel, Copper Tubing, etc. in SWM (Gen Specs)
01-02-000	Shop Sub-Assemblies
01-03-000	Shop Final Assemblies
01-04-000	Field Sub-Assemblies
01-05-000	Field Final-Assemblies
00-06-000	Fabricated Sheet Metal Parts
00-07-000	Fabricated Heavy Metal (Struck, etc.)Parts, Extrusions
00-08-000	Fabricated Tubing and Pipe
00-09-000	Pipe Fittings, Valves, Exp. Comp., Air Vents, Flow Control Check Valves, Stops, Plugs, Pumps
00-10-000	Electrical Parts, Components, Solenoids, Fabricated Wire, Relays, P/C Boards, Contactors, Motors, Terminals, Wire
00-11-000	Heat Exchangers -- Coils, Etc.
00-12-000	Tanks and Vessels, Accumulators, Expansion Tanks
00-13-000	Insulation
00-16-000	Paints, Coatings, Sealants, Adhesives, Etc.
00-17-000	Hardware - Bolts, Nuts, Screws, Hinges, Bearings, Non- Electrical Cable, Clamps, Turn-Buckles, Rivets, Nails, Pins
00-18-000	Machine Parts (Special)
00-19-000	Packaging/Shipping
00-20-000	Glass Glazing Coverings
00-21-000	Weather Stripping, Non-Metallic Grommets, Sponge Rubber, Etc.
00-24-000	Tags, Stickers, Labels, Serial Numbers

*Indicates that no other drawings or specifications other than those contained herein are required.

**Indicates all fasteners, nuts, bolts, and washers are to conform to ANSI (American National Standards Institute).

M-01-000

COMMODITIES

01-000-(099) Steel

- 001 Steel-Galv.-Desg. G90 (1.25oz/S.F.Commercial)
Per ASTM A 525, A526, and A527, subject to ASTM A-90
standard method of test, 16 guage, .0636" (.0672 -
.0606 range) 2.65625 lbs/S.F.
- 002 Steel-Galv. Same as 01-01-001, except 20 Guage .0396
(.0425 - .0382 range) 1.65625 lbs/S.F.
- 004 Steel-Structural-ASTM A36.
- 005 Steel-Tubing-Cold Drawn-Seamless-ASTM A519, Mechanical
Grade
- 007 Steel-Galv. - Same as 01-01-001, except 28 Guage .0187
(.0195 - .0180 range) 0.78125 lbs/S.F.
- 010 Steel-Channel-3/4" x 3/8" x 1/8" .54 lbs/Ft., Structural
A-36
- 011 Pipe, Steel, 1 1/2" Nomanal, Sched 40, 2.72 lbs/L.F.
- 012 Steel, Rod 3/8", A-36 Struct. Steel.

01-100-(199) Copper

- 121 Tube, Type "M" Hard 5/8
- 122 Tube, Type "M" Hard 7/8
- 123 Tube, Type "M" Hard 1-1/8
- 124 Tube, Type "M" Hard 1-3/8
- 01-128 Refrig Tube 1/2 OD
- 0H35-0 Refrig Tube 3/16 OD

01-300-(399) Aluminum

- 301 Aluminum-Bar 5/16" x 1 1/2" - 6061-T6, .551 lbs/L.F.
- 307 Aluminum, Tubing, 5/8" O.D., .527" I.D., 6061-T6.
- 310 Aluminum, Angle, 2" x 1" x 1/8", 6063-T5, 0.431 lbs/L.F.
- 311 Aluminum, Tubing 3/8" O.D., .277" I.D., 6061-T6.
- 312 Aluminum, Angle, 3 1/2" x 2 1/2" x 1/2", 6061-T6
Stand Amer. Shapes, 1.68 lbs/L.F.

01-500-(599) Welding & Brazing Materials

- 01-500 Brazing Rod
- 01-501 Welding Electrode

01-01-000

COMMODITIES (Continued)

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01-600-(699) Lumber, Timber, Plywood & Other Wood Products

01-601

No. 3 Southern Pine, Dimensioned, 54S, Amercian Std., Spa.

01-601

Plywood, Sheath. Grade, DFPA

PART NUMBER	DESCRIPTION
01-02-000	SUB -ASSEMBLIES
01-02-001	Lens Acrylic 120" length. Clear Color.
01-02-002	Electrical Component Board
01-02-006	Manifold Support Column
01-02-007	End Beam - Collector Panel Housing
01-02-009	Torque Trussed Bar - Collector Panel Housing
01-02-010	Flanged Shaft - North End - Collector Panel Housing
01-02-011	Flanged Shaft - South End - Collector Panel Housing
01-02-012	Absorber Tube Assembly - Collector Panel Housing
01-02-016	Tracking Control Box Wiring Diagram 10062-12
01-02-018 *	Wire Set
01-02-019	Truss - Interior Collector Housing
01-02-020	Truss - Exterior Collector Housing
01-02-022 *	Insulation Set - Collector Housing
01-02-027	Pulley - 29" Dia See Drawing
01-02-029	North Manifold Flex Hose Assembly
01-02-030	South Manifold Flex Hose Assembly
01-02-031	Control Box Motor Assembly
01-02-032	Control Limit Switch Assembly
01-02-038	Manifold Conx. Assembly

01-03-000	SHOP FINAL ASSEMBLIES
PART NUMBER	DESCRIPTIONS
01-03-002	South Manifold Support- 3/4 x 3/4
01-03-003	South Manifold Support - 1 x 3/4
01-03-004	South Manifold Support - 1 x 1
01-03-005	South Manifold Support - 1 x 1 1/4
01-03-006	South Manifold Support - 1 1/2 x 1 1/2
01-03-012	South Brace (32°)
01-03-023	North Manifold Support W/Bleeder - 3/4 x 3/4
01-03-024	North Manifold Support - 1 x 3/4
01-03-025	North Manifold Support - 1 x 1
01-03-026	North Manifold Support - 1 x 1 1/4
01-03-027	North Manifold Support W/Bleeder - 1 1/4 x 1 1/4
01-03-032	North Column (32°)
01-03-043	Inclined Strut
01-03-044	Manifold Strut - 3/4"
01-03-045	Manifold Strut - 3/4"
01-03-046	Manifold Strut - 1"
01-03-047	Manifold Strut - 1"
01-03-048	Manifold Strut + 1 1/4"
01-03-049	Collector Panel Housing
01-03-050	North Wind Strut
01-03-051	End Enclosure - Lens
01-03-053	Solar Sensor Assembly
01-03-055	Absorber Tube
01-03-060	Bleeder Valve Assembly
01-03-063	Fluid Outlet 1 1/4"

01-03-000(Continued)

PART NUMBER	DESCRIPTION
01-03-066	Control Box Mount (East and West)
01-03-067	Idler Pulley Mount Assembly
01-03-068	Inlet & Outlet Closure Plate 1½"
01-03-069	Tracking Control Box (1" Power Screw)
01-03-073	Closure Plate

01-04-000

FIELD SUB-ASSEMBLIES

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PART NUMBER

DESCRIPTION

01-04-004

Collector Panel

01-04-005

South Wind Bracing

01-04-006

North Upper Wind Bracing

01-04-007

Inclined Strut

01-04-008

Tracking Box Mounting

01-04-009

Idler Pulley Mounting

01-04-010

Manifold Strut - 3/4"

01-04-011

Manifold Strut - 3/4"

01-04-012

Manifold Strut - 1"

01-04-013

Manifold Strut - 1"

01-04-014

Manifold Strut - 1 1/2"

01-04-015

Manifold Strut - 1 1/2"

01-04-024

North Wind Strut

01-04-035

North Lower Wind Bracing (32°)

01-04-044

South Brace Assembly (32°)

01-04-057

Fluid Inlet Assembly 1 1/2"

01-04-062

Fluid Outlet 1 1/2"

01-04-065

Manifold End Closure 3/4"

01-04-067

Cable Drive 41 L.F.

01-04-068

Cable Drive 68 L. F.

01-04-069

Cable Drive 96 L.F.

01-04-070

Cable Drive 125 L.F.

01-04-071

Cable Drive 151 L.F.

01-04-072

Cable Drive 179 L.F.

01-04-000 (Continued)

PART NUMBER	DESCRIPTION
01-04-073	Cable Drive 206 L.F.
01-04-074	Cable Drive 234 L.F.
01-04-075	Cable Drive 262 L.F.
01-04-076	Cable Drive 289 L.F.
01-04-077	Sensor Attachment TRD-3
01-04-083	Manifold Conx. Assembly $3/4 \times 3/4$
01-04-084	Manifold Conx. Assembly $1 \times 3/4$
01-04-085	Manifold Conx. Assembly 1×1
01-04-086	Manifold Conx. Assembly $1\frac{1}{4} \times 1$
01-04-087	Manifold Conx. Assembly $1\frac{1}{4} \times 1\frac{1}{4}$
01-04-088	North & South Manifold Support Assembly

<u>01-05-000</u>	FIELD FINAL ASSEMBLIES
PART NUMBER	DESCRIPTION
01-05-007	Field Assembly - NSC-01-07 (Seven Panel & Frame)
01-05-076	List of Materials NSC-01-07 (32 ⁰)
01-05-122	Field Assembly Section CC
01-05-123	Bolt Settling Plan NSC-01-0732
01-05-124	Spare Parts List
01-05-129	Illustrated Assembly - TYP Array Bay

01-06-000

FABRICATED SHEET METAL PARTS

PARTS NUMBER

DESCRIPTION

01-06-002	Electrical Component Board Wrapper 20 Ga. Galv. $4\frac{1}{2}" \times 15"$ (.47 Ft. ²)
01-06-003	Electrical Component Board Lid 20 Ga. Galv. $4" \times 3"$ (.22 Ft. ²)
01-06-007	Manifold Strut, End Clip Angle 16 Ga. Galv. $3" \times 4"$ (.09 Ft. ²)
01-06-009	Capacitor Mounting Strap 20 Ga. Galv. $3/4" \times 4\ 7/8"$ (.03 Ft. ²)
01-06-010	Flange Stiffener 5", 5 1/8", & 5 1/4" Wide Struts 16 Ga. Galv. $6" \times 3"$ (.125 Ft. ²)
01-06-011	Flange Stiffener with Base Angle Connection 16 Ga. Galv. $5" \times 6"$ (.21 Ft. ²)
01-06-022	Flange Stiffener for 5" Wide Struts, See 01-06-010 16 Ga. Galv. $6" \times 3"$ (.125 Ft. ²)
01-06-023	Flange Stiffener for 5 1/4" Wide Struts, See 01-06-010 16 Ga. Galv. $3" \times 6"$ (.125 Ft. ²)
01-06-024	Web Member (Wide) Collector Truss 20 Ga. Galv. $3\ 7/16" \times 13\ 7/16"$ (.32 Ft. ²)
01-06-025	Web Member (Narrow) Collector Truss 20 Ga. Galv. $3\ 3/8" \times 13\ 9/16"$ (.32 Ft. ²)
01-06-026	Cord Top and Bottom Collector Truss 20 Ga. Galv. $3\ 3/4" \times 128\ 3/4"$ (3.353 Ft. ²)
01-06-027	End Strut Collector Truss 20 Ga. Galv. $4\ 1/16" \times 11"$ (.3 Ft. ²)
01-06-028	End Beam, Collector Panel 16 Ga. Galv. $16\ 1/4" \times 58\ 5/16"$ (6.58 Ft. ²)
01-06-029	Lens Guide 20 Ga. Galv. $3\ 5/8" \times 66\ 13/16"$ (1.682 Ft. ²)
01-06-030	Lens Retainer - Top End 16 Ga. Galv. $4\ 1/2" \times 1\ 1/2"$ (.047 Ft. ²)
01-06-032	North Manifold/Collector Connect Housing Wrapper 16 Ga. Galv. $11\ 1/8" \times 32\ 1/2"$ (1.8 Ft. ²)
01-06-033	Manifold/Collector Connect Housing Lid 16 Ga. Galv. $6\ 1/4" \times 10"$ (.43 Ft. ²)
01-06-034	Manifold/Collector Connect Housing Bottom 16 Ga. Galv. $6" \times 10"$ (.42 Ft. ²)

01-06-000 (Continued)

PART NUMBER	DESCRIPTION
01-06-036	Manifold Support Column 16 Ga. Galv. 37½" x 15" (3.9 Ft. ²)
01-06-037	Manifold Strut 16 Ga. Galv. 114½" x 15" (11.93 Ft. ²)
01-06-038	Manifold Strut Cover 16 Ga. Galv. 114½" x 6½" (4.97 Ft. ²)
01-06-039	Inclined Strut 16 Ga. Galv. 12" x 144" (12 Ft. ²)
01-06-040	Bottom and Side Covering - Collector Panel Housing 26 G. Galv. 42" x 133 5/8" (39.97 Ft. ²)
01-06-041	Manifold Positioning Plate 3/4", 16 Ga. Galv. 3 7/8" x 7/8" (.19 Ft. ²)
01-06-042	Manifold Positioning Plate 1", 16 Ga. Galv. 3 7/8" x 7/8" (.19 Ft. ²)
01-06-043	Manifold Positioning Plate 1½", 16 Ga. Galv.
01-06-044	Manifold Positioning Plate 1½", 16 Ga. Galv.
01-06-045	Manifold Positioning Plate 2", 16 Ga. Galv.
01-06-046	Torque Bar-Top Right Hand 16 Ga. Galv. 6" x 133 15/16" (5.581 Ft. ²)
01-06-047	Torque Bar-Top Left Hand 16 Ga. Galv. 6" x 133 15/16" (5.581 Ft. ²)
01-06-048	Torque Bar-Bottom 16 Ga. Galv. 6" x 122 15/16" (5.122 Ft. ²)
01-06-049	Truss Connector-Torque Bar-Top 16 Ga. Galv. 1 3/4" x 3 7/16" (.042 Ft. ²)
01-06-050	Torque Truss Connector-Bar-Bottom 16 Ga. Galv. 1 3/4" x 3 9/16" (.068 Ft. ²)
01-06-051	End Connector-Trussed Torque Bar 20 Ga. Galv. 4 1/16" x 1" (.028 Ft. ²)
01-06-052	Flange Stiffener-Wind Bracing Connector 16 Ga. Galv. 3 x 6 (.125 Ft. ²)
01-06-053	Outlet Closure Plate - Blank 16 Ga. Galv. 4" x 7" (.2 Ft. ²)
01-06-056	Outlet Closure Plate - 1½" 16 Ga. Galv. 4" x 6½" (.17 Ft. ²)
01-06-059	Control Box Mount 16 Ga. Galv. 12" x 26" (2.17 Ft. ²)
01-06-061	Bridging-Cross-Collector Panel 16 Ga. Galv. 9/16" x 15½" (.061 Ft. ²)
01-06-062	Bridging-Top & Bottom Collector Panel 16 Ga. Galv. 1½" x 1 5/8" (.10 Ft. ²)
01-06-063	Bridging-Vertical Collector Panel 16 Ga. Galv. 1 5/8" x 11" (.12 Ft. ²)
01-06-064	Bridging-Connector-Torque Bar, Right Hand, Collector Panel 16 Ga. Galv. 1 5/8" x 1" (.011 Ft. ²)

01-06-000 (Continued)

PARTS NUMBER	DESCRIPTION
01-06-069	South Brace (32°) 16 Ga.Galv. 12 3/8" x 26 3/16" (2.25 Ft. ²)
01-06-075	South Manifold Connect Housing Wrapper. 16 Ga. Galv. 11 1/8" x 23 1/2" (1.8 Ft. ²)
01-06-079	Bridging Connector-Torque Bar-Left Hand, Collector Panel 16 Ga.Galv. 1 5/8" x 1" (.011 Ft. ²)
01-06-080	South Brace (32°) See 01-03-012. 16 Ga. Galv. 12 3/8" x 26 3/16" (2.25 Ft. ²)
01-06-081	Idler Pulley Wrapper 16 Ga.Galv. 5' x 16 11/16" (.58 Ft. ²)
01-06-082	North Wind Strut, See 01-03-150. 16 Ga.Galv. 119 1/2" x 12" (9.96 Ft. ²)
01-06-083	North Column (32°). See 01-03-032. 16 Ga. Galv. 3" x 6" (.125 Ft. ²)
01-06-104	Sensor Positioning Bracket 16 Ga.Galv. 4 1/2" x 1/2" (.015 Ft. ²)
01-06-107	Cap-Idler Pulley Mount 16 Ga. Galv. 5 1/16" x 5 7/8" (.21 Ft. ²)
01-06-109	High Limit Switch U-Fastener 16 Ga.Galv. 2 3/8" x 2 1/2" (.041 Ft. ²)
01-06-110	Solar Sensor Mount 16 Ga. Galv. 5" x 7 1/4" (.252 Ft. ²)
01-06-111	Absorber Tube Retainer 16 Ga. Galv. 2 3/16" x 3 3/4" (.06 Ft. ²)
01-06-112	End Plate. See 01-03-051. 16 Ga. Galv. 5 1/8" x 12" (.427 Ft. ²)
01--6-122	Wrapper-Tracking Control Box. 01-03-069. 16 Ga. Galv. 2 1/2" x 25 7/8" (3.86 Ft. ²)
01-06-123	End Panel-Tracking Control Box. 01-03-069. South End. 16 Ga.Galv. 7 1/4" x 8 15/16" (.45 Ft. ²)
01-06-124	End Panel-Tracking Control Box. 01-03-069. North End. 16 Ga. Galv. 7 1/4" x 8 15/16" (.45 Ft. ²)
01-06-125	Bracket-Bearing Box. 01-03-069. 16 Ga.Galv. 11 3/4" x 5 7/8" (.48 Ft. ²)
01-06-126	Cover for Limit Switch-Tracking Control Box 01-03-069, West Side. 20 Ga.Galv. 4 1/8" x 5 13/16" (.17 Ft. ²)
01-06-127	Cover for Limit Switch-Tracking Control Box 01-06-069, East Side 20 Ga. Galv. 4 1/8" x 5 13/16" (.17 Ft. ²)
01-06-132	Pulley Cable Clamp Plate. 16 Ga.Galv. 1/2" x 1 1/2" (.005 Ft. ²)
01-06-133	Tracking Control Box Cover 01-03-069. 16 Ga.Galv. 8 15/16" x 26 15/16" (1.67 Ft. ²)

01-06-000 (Continued)

PARTS NUMBER	DESCRIPTION
01-06-134	SHIM Control Box, Left Side, 16 Ga. Galv. STL. 4 5/8" x 3" (.096 Ft. ²)
01-06-135	SHIM Control Box, Right Side, 16 Ga. Galv. STL. 4 5/8" x 3" (.096 Ft. ²)
01-06-136	MTG Bracket-- Motor (01-03-069 Control Box) 16 Ga. Galv. 3" x 5 1/8" (.11 Ft. ²)
01-06-137	Lens End Closure Weather Strip Plate. 20 Ga. Galv. 4 1/16" x 12 1/2" 9.346 Ft. ²)
01-06-138	Lens Guide-Splicer. 20 Ga. Galv. STL 3 7/16" x 3" (.072 Ft. ²)
01-06-162	Flange Stiffener. 16 Ga. Galv. 3" x 6 1/2" (.135 Ft. ²)

01-07-000	FABRICATED HEAVY METAL (STRUCTURAL, ETC.) PARTS
PARTS NUMBER	DESCRIPTION
01-07-003	South Col. Base Angle, 3½" x 2½" x ¼" x 2'-11" 6061-T6 Alum. 1.681 lbs/L.F. (01-312)
01-07-017	Flange-Shaft Collector Panel ASTM A-36 Structural STL. ½" thick Plate.
01-07-023	Housing-Fower Screw, East Side, Control Box, 01-03-069
01-07-024	Housing-Power Screw, West Side, Control Box, 01-03-069
01-07-025	Pulley Rim, See Drawing. ¾" x ⅜" x 1/8" x 104" ASTM A-36 Structural Steel Channel .54 lbs/Ft.
01-07-026	Pulley Top Spoke, See Drawing. ¾" x ⅜" x 1/8" x 13 17/32 ASTM A-36 Structural Steel.
01-07-027	Pulley Bottom Spoke, See Drawing. ¾" x ⅜" x 1/8" x 13 17/32" ASTM A-36 Structural Steel
01-07-028	Pulley Horizontal Spoke, See Drawing. ¾" x ⅜" x 1/8" x 13 17/32" ASTM A-36 Structural Steel
01-07-029	Pulley Hub, See Drawing. Schedule 40 black Steel Pipe x 13/8" Length.
01-07-030	Pulley Mount Angle, See Drawing. 2" x 1" x 1/8" x 0'-2¼" Alum. Angle, 6063-T5.

01-08-000

FABRICATED TUBING & PIPE

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PARTS NUMBER

DESCRIPTION

01-08-002 *	Manifold 3/4" x 119 11/32" Type "M" cu.
01-08-003 *	Manifold 3/4" x 118 3/4" Type "M" cu.
01-08-004 *	Manifold 1" x 119 3/32" Type "M" cu.
01-08-005 *	Manifold 1" x 118 7/16" Type "M" cu.
01-08-006 *	Manifold 1 1/4" x 118 13/16 Type "M" cu.
01-08-011 *	Tee, Bleeder Connecting Type "M" cu. 4" x 1/2"
01-08-012 *	Fluid Outlet Pipe 1 1/4 dia x 10". See 01-03-063. Type "M" copper.
01-08-017 *	Maid-O-Mist Lead Tube 1/2" Type "L" x 5"
01-08-018 *	Pressure Relief Valve Lead Tube, 3/4" x 2" "M"
01-08-019 *	Schrader Valve Connect Tube 3/16 O.D. "L" x 4 1/2 Soft Dr. Copper (00-01-135)
01-08-020 *	Absorber Tube (w/tubes & caps) Exterior, Type "M" copper. See 01-02-012.
01-08-021 *	Absorber Tube (w/tubes & caps) Interior, Type "M" copper. See 01-02-012.
01-08-023 *	Absorber Tube Manifold Pipe, Exterior 5/8" O.D. 1/2" nom x 6.313" Type "M" Copper
01-08-024 *	Absorber Tube Manifold Pipe, Interior 5/8" O.D. 1/2" nom x 6.125" Type "M" Copper
01-08-025 *	Absorber Tube Manifold Pipe North 5/8" O.D. 1/2" nom x 5.0" Type "M" Copper.
01-08-026 *	Absorber Tube Manifold Pipe, South 5/8" O.D. 1/2" nom x 3.625" Type "M" Copper.
01-08-027 *	Absorber Tube Manifold Riser 5/8" O.D. 1/2" nom x 2 13/32" Type "M" Copper

01-09-000	PIPE FITTINGS, VALVES, EXP. COM., AIR VENTS, FLOW CONTROL, CK VALVES, STOPS, PLUGS, PUMPS, H ₂ O ACCESSORIES.
PART NUMBER	DESCRIPTION
01-09-001 *	Maid-O-Mist #74 W/1/2" FPT Auto-Vent, Air Eliminator
01-09-002 *	Pressure Relief Valve Watts #3L, 125 PSI Release, ASME, 3/4" MPT Connector
01-09-004 *	Swivel Conn. GRA-TEK
01-09-005 *	Schrader Valve Insert
01-09-006 *	Adapter Cu. Tube 3/3" O.D., 1/2" MPT, Cast Brass
01-09-007 *	Cap - Cu. Tube, Wrought Copper, 1 3/8" O.D.
01-09-008 *	Wrought Tee 1/2 x 3/4 x 3/4
01-09-009 *	Wrought Tee 1/2 x 1 x 3/4
01-09-010 *	Wrought Tee 1/2 x 1 x 1
01-09-011 *	Wrought Tee 1/2 x 1 x 1 1/4
01-09-012 *	Wrought Tee 1/2 x 1 1/4 x 1 1/4
01-09-014 *	Wrought Tee 1/2 x 1 1/2 x 1 1/2
01-09-016 *	Flex Hose GRA-TEK
01-09-017 *	Adapter, Wrought cu., 3/8" O.D. Sweat x 1/2" MPT
01-09-018 *	Adapter, Wrought cu., 7/8" O.D. Sweat x 3/4" MPT
01-09-019 *	Wrought Tee 1/2 x 1/2 x 1/2
01-09-020 *	1/2 Nom. Short Rad. (Elbow) 90° Elbow, Wrought
01-09-021 *	1/2 Nom. Wrought Coupling W/Stop Lee
01-09-022 *	1/2 Nom. Male Adapter, Wrought
01-09-024 *	Schrader Valve 1/4" Flare Adapter
01-09-060 *	Adapter Wrot., 5/8" x 1/2", LEE #15-101 or equal (MPT)
01-09-062 *	Plug. Wrot. Cu. to Fit 7/8" O.D. Fitting

01-10-000

ELECTRICAL PARTS, COMPONENTS, SOLENOIDS, FABRICATED WIRE,
RELAYS, P/C BOARDS, CONTACTORS, MOTORES, TERMINALS, WIRE

PART NUMBER

DESCRIPTION

01-10-002 *	Potted P/C Board
01-10-003 *	Relays
01-10-004	Transformer
01-10-005 *	Capacitor
01-10-006 *	Fuse
01-10-007	Limit Switch
01-10-008	Relay Receptacle (2) Socket
01-10-009	P/C Board Connector
01-10-010 *	Fuseholder
01-10-011	Solar Discs 2½" x 1 3/4" P.C. Board
01-10-012	Sensor Cells - Photovoltaic
01-10-015 *	Sensor Discs Wire 2" Length Black
01-10-017 *	Control Box Leads (1) Blu (1) Blk (1) Org, All 10'
01-10-018 *	High Limit Switch - Fenwal or Equal 10A1250A240VAC NON - IND.
01-10-019	High Limit Switch Bridge Fastener Bakelite
01-10-038	Motor, Gear, Tracking Box (01-03-069)

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00-13-00

INSULATION

PART NUMBER

DESCRIPTION

01-13-002 *	Owens Corning Fiberglass Insulation, 1" Thk, RA 22
01-13-003 *	Fiberglasspouring insulation, Owens Corning 1 Bag = 7.5 Ft. ³
01-13-004 *	Batt - 1000 ^o F Owens Corning AFU Solar 1000 ^o
01-13-005 *	$\frac{1}{2}$ x 2 $\frac{1}{2}$ Du Pont Microform Insulation
01-13-006 *	$\frac{1}{4}$ x 3 $\frac{7}{8}$ Du Pont Microform Insulation
01-13-007 *	1" Thk Smooth Foil Back Duet Board Insulation

00-16-000

PAINTS, COATINGS SEALANTS, ADHESIVES, ETC.

PART NUMBER

DESCRIPTION

00-16-001

Z.R.C. Metal Conditioner

00-16-002

Z.R.C. Zinc Coating

00-16-003

Z.R.C. Zinc Coating Thinner

00-16-004 *

Selective Coating, NASA Black Chrome, Olympic

01-17-000 * HARDWARE -- BOLTS, NUTS, SCREWS, HINGES, BEARINGS, NON-ELECTRICAL CABLE, CLAMPS, TURN-BUCKLES, NAILS, PINS

PARTS NUMBER	DESCRIPTION
01-17-002	Screw #4 x $\frac{1}{2}$ (40 TPI) Zinc
01-17-003	Stand off $\frac{1}{4}$ O.D. x $\frac{1}{2}$, Threaded (40 TPI) Alum.
01-17-004	#6 x 1 $\frac{1}{8}$ " (32 TPI), Slotted Head, Zinc Coated
01-17-008	#8 x $\frac{1}{2}$, S.D. & S.T. (Tek) Screw, 18 TPI
01-17-009	Pulley 12" O.D. x $1\frac{1}{2}$ " Bore with Cable Clamp Bale
01-17-010	$\frac{3}{8}$ x $\frac{3}{4}$ " Hex Bolt, Zinc Coated
01-17-011	$\frac{3}{8}$ " Hex Nut, Zinc Coated
01-17-012	$\frac{3}{8}$ " Lock Washer, Zinc Coated
01-17-013	$\frac{1}{2}$ " x $6\frac{1}{2}$ " Hex Bolt, Mach. Bolt, Zinc Coated
01-17-014	$\frac{1}{2}$ " Hex Nut UNC, Zinc Coated
01-17-015	$\frac{1}{2}$ " Lock Washer, Zinc Coated
01-17-016	Bearing $1\frac{1}{2}$ " Cast Iron, Set Screw
01-17-019	Cable Clamp $\frac{1}{4}$ ϕ
01-17-021	SPLIT Lock Washer (#6) Zinc Coated
01-17-022	Nut, Hex #6 (32TPI) Zinc Coated
01-17-027	Bolt, Machine Hex Head, $\frac{1}{4}$ " x $\frac{1}{2}$ ", INC. Zinc Coated
01-17-028	Nut, Hex Head $\frac{1}{4}$ " UNC, Zinc Coated
01-17-029	Lock Washer $\frac{1}{4}$ ". Zinc Coated
01-17-030	Bolt Spacer $\frac{1}{2}$ ϕ x 5 $\frac{3}{8}$ "
01-17-035	Cable, Aircraft, Galv. 7 x 7, $\frac{1}{4}$ " Dia. Preformed
01-17-036	Bolt Spacer $\frac{1}{2}$ " I.D. x $7\frac{1}{4}$ "/8", Alum. Tube (01-307)
01-17-037	Bolt Spacer $\frac{1}{2}$ " x 5, Alum. Tube (01-307)
01-17-039	Bolt Spacer $\frac{1}{2}$ " x 5 $\frac{3}{16}$ Alum. Tube (01-307)
01-17-041	$\frac{1}{2}$ ϕ Flat Washer 12 Ga.
01-17-044	Pop Rivets $\frac{1}{8}$ " Alum. x $\frac{1}{4}$ " length
01-17-045	Pin, $\frac{1}{4}$ " x $2\frac{1}{2}$, Hex H.D.

01-17-000 (Continued)

PARTS NUMBER	DESCRIPTION
01-17-046	Heyman Mfg. Co. Wire - Ty W/Screw Hole. -8 Screw
01-17-049	Bolt Carriage 3/8" x 3/4" UNC (UNC)
01-17-050	Flange (1 1/2) 4-25-172
01-17-051	Nut, Hex 3/8" -16 TPI Zinc Coated
01-17-052	3/8" Lock Washer Zinc Coated
01-17-053	Bearing (1 1/2) Bearing
01-17-054	Locking Collars (1 1/2) Bearing
01-17-056	Fastner-Lock 1/2" (Timmerman) C12007-017, or Equal
01-17-057	Bolt-Mach. - 1/2 x 2 1/2 Hex H.D.
01-17-058	Spacer Bolt - 1/2 x 1 11/16, Alum. Tube (00-01-311)
01-17-059	Spacer Bolt - 1/2 x 1 13/16, Alum. Tube (00-01-311)
01-17-060	#6 - 32 x 3 1/8" Screw R.N. HD, Zinc Coated
01-17-061	#6 - 32 Hex Nut
01-17-062	Bolt Hex 1/2 x 1 1/2 UNC, Zinc Coated
01-17-063	Fastener Lock 1/2 x 4 (Timmerman) or Equal
01-17-065	5/8 Nut Zinc Coated
01-17-066	5/8 Bolt x 1 1/2 Zinc Coated
01-17-067	Lock Washer (5/8) Zinc Coated
01-17-072	3/8 Flat Washer Zinc Coated
01-17-073	Cable Thimble 1/2" Zinc Coated
01-17-074	Turnbuckle 3/8 x 6", Galv., Equal to Upson Walton H-62GJJ Galv. with 2-114 Lock Nuts
01-17-075	1/2" x 20, Hex Nut, Zinc Coated
01-17-076	1/2" Star Lock Washer, Zinc Coated
01-17-077	Turnbuckle for Wind Bracing, H31, 3/8 x 6" Upson/Walton- Galv. (No Eye, Hook or Jaws)
01-17-078	#4 40 TPI x 1/2" Bolt, Zinc Coated
01-17-079	#4 40 Nut, Zinc Coated
01-17-080	#4 Lock Washer, Zinc Coated

01-17-000 (Continued)

PARTS NUMBER	DESCRIPTION
01-17-081	#6 x 1/2, 32 TPI Slotted Round Head, Zinc Coated
01-17-082	#6 Hex Nut, 32 TPI, Zinc Coated
01-17-083	#6, Star Lock Washer, Zinc Coated
00-17-095	1/2" Dia. x 1/2", Mach. Bolt, Slotted, Rd. H.D., Unc., Zinc Coated
00-17-096	1/2" Dia., Hex Nut, UNC. Zinc Coated
00-17-098	Wind Brace Lower, 3/8" x 2'-0" A36 STL Rod W/ 6" Left Hand Thread, 3/8-16, Galv. After Fabrication.
00-17-099	North (Lower) End, Wind Brace, Upper, 3/8" x 9'-4" A36 Stl. Rod W/3/8"-16 TPI x 0'-6" R. H. Thread. Galv. After Fabrication
00-17-100	North & South (Upper) End Wind Brace, Upper, 3/8" x 7'-10" A36 St. Rod W/3/8 - 16TPI x 0'-6" R. H. Thread, Galv. After Fabrication
00-17-118	Bearing Flanged Cast Housing (Two Bolt) NTN Toyo Brg. Co. #UCFL 209, 1 3/4 I.D.
00-17-119	Sprocket, 3/8" Bore for No. 35 3/8" Pitch American Std. Roller Chain, Browning No. 359.
00-17-120	Sprocket, 1 3/4 Bore for No. 35 3/8" Pitch, American Std. Roller Chain, Browning No. 35B45
00-17-121	Roller Chain, 3/8" Pitch No. 35 Single Strand
00-17-122	Pin Stl. 1/2", Hex x 3"
00-17-123	Brazing Rod (01-500)
01-17-129	Steel Retainer Clip for Swivel
01-17-130	Screw, #8x 5/8, Hex HD, With Neoprene Washer Bonded to Metal Cap, S.D & S.T. Equal to TEK

01-18-000

MACHINED PARTS (SPECIAL)

PARTS NUMBERS

DESCRIPTION

01-18-005	Shaft-North End Collector Panel, Cold Drawn Seamless STL Tubing ASTM 519 1½" O.D. x 0.109 Wall Thk x 3 7/8" Length
01-18-006	Shaft-South End Collector Panel Cold Drawn Seamless STL Tubing ASTM 519 1½" O.D. x 0.109 Wall Thk x 2½" Length
01-18-009	Shaft - 1½ Dia. x 0.109 Wall Thk'ness Cold Drawn Seamless Steel Tubing ASTM 519 Mech. Grade x 9½" Length
01-18-010	Power Screw and Nut, Tracking Control Box 01-03-069
01-18-014	Cable Guide (01-03-069 Control Box)

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00-19-001

PACKAGING/SHIPPING

PARTS NUMBER

DESCRIPTION

01-19-008 *

Carton for NASA Prototype

00-20-000

GLASS, GLAZING COVERINGS

PARTS NUMBER

DESCRIPTION

00-20-001

Lens, Collector "ML" Series 133 5/8" x 8" Radius

01-20-002

End Cap 3" O.D. x 3/16" Black Acrylic

01-20-003

Solar Disc's Base 2 3/8" x 2 23/32" x 3/16" Plexiglass

01-20-004

Sensor Tube 3" O.D. x 2 3/4" Clear Plexiglass

01-21-000 *

WEATHER STRIPPING, NON-METALIC GROMMETS, SPONGE RUBBER, ETC.

PARTS NUMBER

DESCRIPTION

01-21-001

Grommets "Rubber" Atlantic India, #2856 or Equal

01-21-004

Weatherstripping self-adhesive, 3/4 x 3/16 Cleotex

01-21-005

Grommet North Manifold Atlantic India #2903 or Equal

01-21-006

Silicon Sealant Equal to GE RTV White

01-21-019

Silicon Sealant Equal to GE RTV Black

01-21-021

Viton "O" Ring

SHOP FINAL
ASSEMBLY

PART / ASSEMBLY

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

LIST OF MATERIALS

01-03-009

DATE 3-28-78

①

TRACKING CONTROL
BOX

REV

SHT. 1 of 2

PART. NO. / REV / DESCRIPTION

01-03-009

TRACKING CONTROL BOX

01-06-122

WRAPPER 16 GA. GALV. 21 1/2" x 25 1/8" (3.86#)

01-06-123

SOUTH-END PANEL 16 GA. GALV. 7 1/2" x 8 1/2" (.45#)

01-06-124

NORTH-END PANEL 16 GA. GALV. 7 1/2" x 8 1/2" (.45#)

01-06-133

COVER 16 GA. GALV. 8 3/8" x 26 1/8" (1.67#)

01-02-031

MOTOR ASSEMBLY

01-06-136

MOUNTING BRACKET 16 GA. GALV. 3" x 5 1/2" (.11#)

01-10-033

MOTOR GEAR

01-02-002

ELECTRICAL COMPONENTS ASSEMBLY

01-06-002

WRAPPER 20 GA. GALV. 4 1/2" x 15" (.47#)

01-06-003

WRAPPER LID 20 GA. GALV. 4" x 9" (.23#)

01-10-010

PUSHHOLDER

01-10-003

FUSE

01-21-001

GROMMET RUBBER-ATLANTIC INDIA #2356 OR EQUAL

01-10-003

SOCKET, RELAY

01-10-009

RECEPTACLE, P/C BOARD

01-10-004

TRANSFORMER

01-10-003

CAPACITOR

01-06-009

CAPACITOR STRAP 20 GA. GALV. 3 1/2" x 4 1/8" (.03#)

01-02-013

WIRE SET

01-02-032

LIMIT SWITCH ASSEMBLY

01-10-007

LIMIT SWITCH

01-06-126

WEST SIDE COVER, 20 GA. GALV. 4 1/8" x 5 1/8" (.17#)

01-06-127

EAST SIDE COVER, 20 GA. GALV. 4 1/8" x 5 1/8" (.17#)

01-18-010

POWER SCREW AND NUT

01-07-023

EAST SIDE POWER SCREW HOUSING

01-07-024

WEST SIDE POWER SCREW HOUSING

01-18-014

CABLE GUIDE

01-06-123

BEARING BRACKET 16 GA. GALV. 11 3/4" x 5 1/8" (.45#)

00-17-113

BEARING 1 1/4" NTN #UCFL 207-13 G (G) OR EQUAL

00-17-117

SPROCKET 3/8" BORE BROWNING #359 OR EQUAL

00-17-120

SPROCKET 1 1/4" BORE BROWNING #359 OR EQUAL

00-17-121

CHAIN 3/8" PITCH, BROWNING #35 OR EQUAL

01-10-002

P/C BOARD - POTTED W/RTV

01-10-003

RELAYS

01-21-001

GROMMET RUBBER-ATLANTIC INDIA #2356 OR EQUAL

00-17-122

STRIKE PIN

00-17-056

FASTENER-LOCK 1/4" (THERMAN) C1207-017 OR EQUAL

01-17-062

BOLT HEX 1/2" x 1/2" - 13 UNC ZINC

01-17-015

LOCKWASHER 1/2" x ZINC

01-17-014

HEX NUT 1/2" x 13 UNC ZINC

01-17-010

BOLT HEX 3/8" x 3/4" - 16 UNC ZINC

01-17-012

LOCKWASHER 3/8" x ZINC

01-17-011

HEX NUT 3/8" x 16 UNC ZINC

01-17-027

BOLT HEX 1/4" x 1/2" - 20 UNC ZINC

01-17-029

LOCKWASHER 1/4" x ZINC

01-17-028

HEX NUT 1/4" x 20 UNC ZINC

01-17-031

SCREW - #2 x 1/2 - 32 SLOT HEAD, ZINC

01-17-002

SCREW - #4 x 1/2 - 40 SLOT HEAD, ZINC

01-17-003

STAND OFF 1/4" x 1/2 THREADED P.H. SMITH #3453 OR EQUAL

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NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

01-03-069
DATE 3-28-73

①

FIELD SUB-ASSEMBLY - PART

← SHOP FINAL ASSEMBLY - PART

← SHOP SUB-ASSEMBLY - PART

← PART

TRACKING CONTROL
BOX

REV

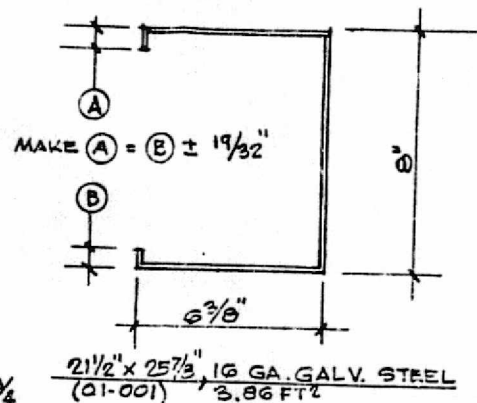
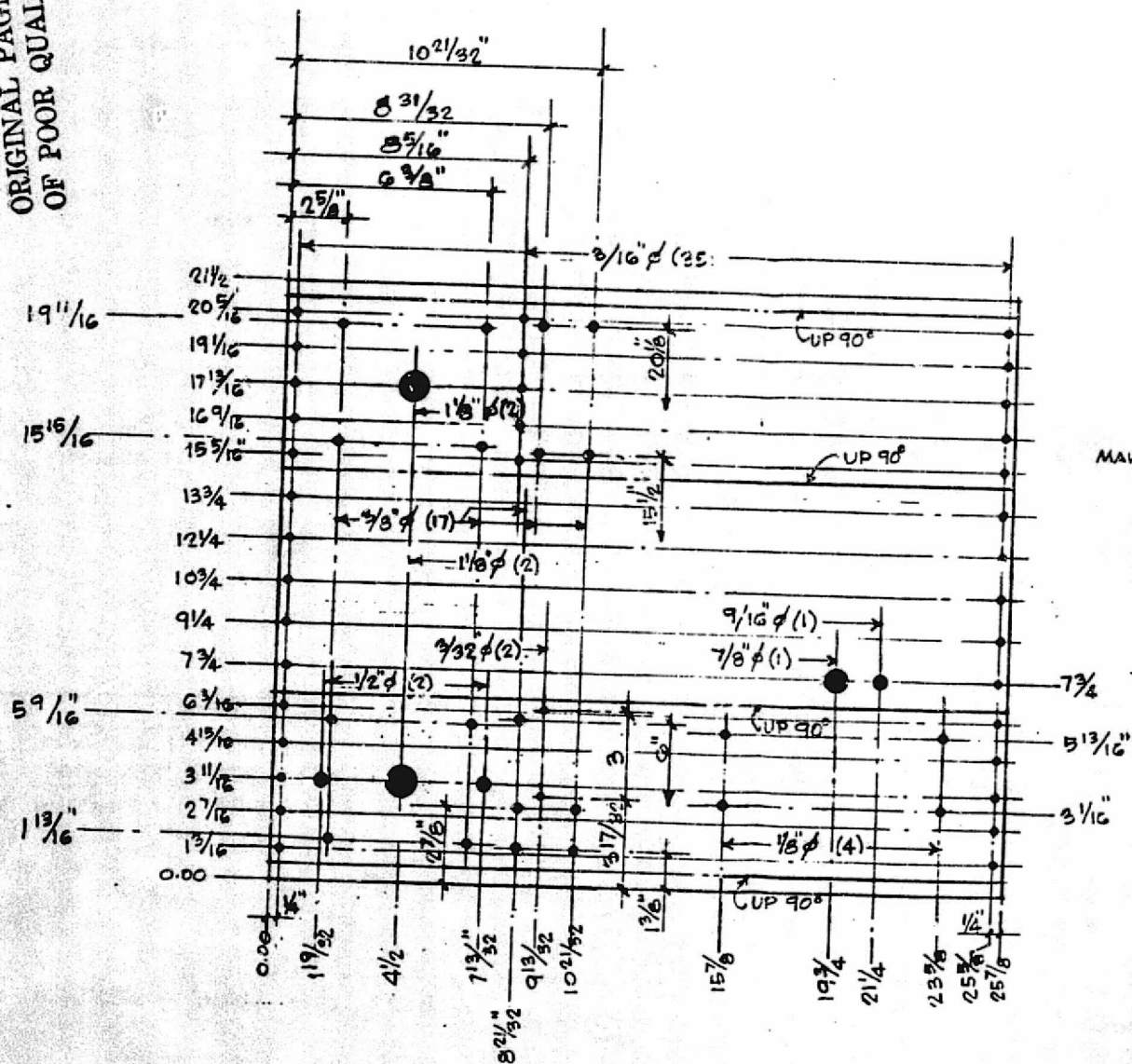
CHT. 2 of 2

PART. NO. / REV / DESCRIPTION

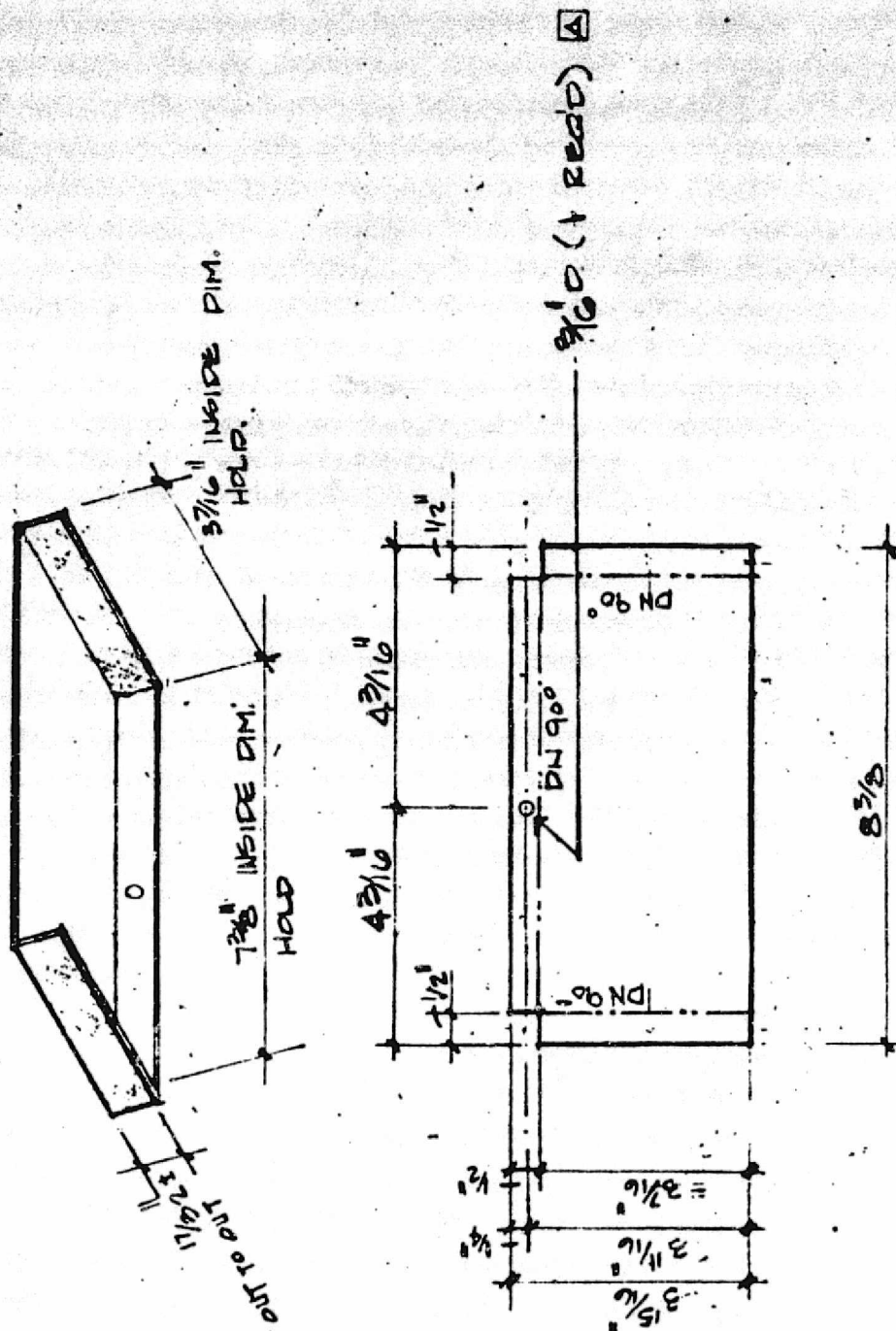
55	01-17-003	SCREWS - #8 - 1/2 S.D. & E.T.
2	01-17-013	SCREW - #4 - 1/2 (40 T.P.I.) ZINC
2	01-17-011	NUT HEX #4-40 ZINC
2	01-17-050	LOCKWASHER #4 ZINC
9	01-17-044	RIVET, POP - 1/8" φ ALUM
4	01-17-054	SCREW #6 x 1 - 32 SLOT HEAD, ZINC
4	01-17-022	NUT, HEX #6 - 32 ZINC
4	01-17-021	LOCKWASHER SPLIT #6 ZINC

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NORTHROP NORTHROP, INCORPORATED 302 Nichols Drive, Muenster, Texas 75141	WRAPPER FOR		51-06-122
	TRACKING (01-03-069)		DNW CMK
	CONTROL BOX		9-13-78 RLV



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ELECTRICAL COMPONENT BOARD LID

SCALE 1:3
20 GA. GALV. STL. RECD. (01-01-002)
CHEESE SIZE: 8 3/8" x 5 3/16"

REF 01-02-002

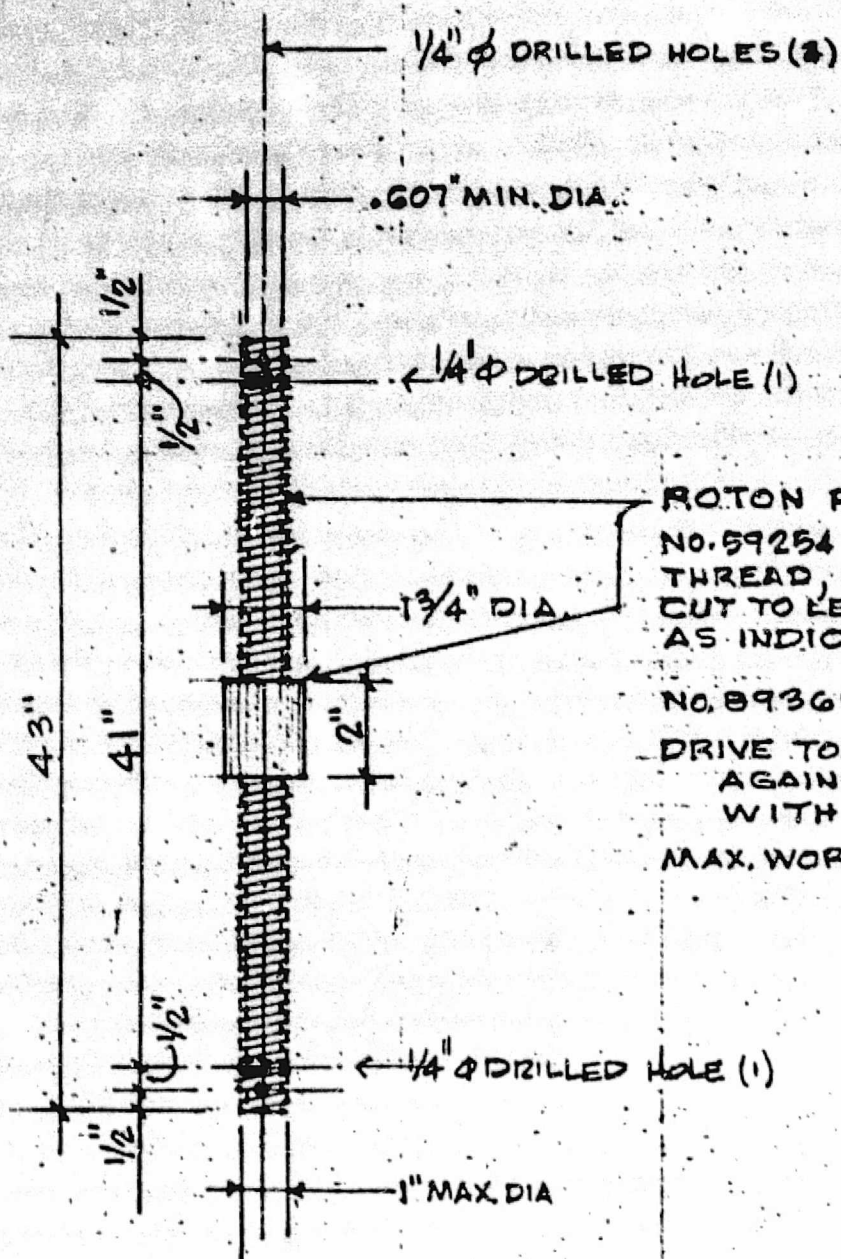
REVISIONS			
Δ	HOLE DIM	10-6-77	RB
B	NOTES	1-6-78	RB
C	MODIFICATION PER FABRICATION	3-14-78	bg
	REDRAWN		

NORTHROP

ORTHROP INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

ELECTRICAL COMPONENT
BOARD LID

CI-06-003
REV RB
7-26-77 REV B



ROTON PRODUCTS, INC

NO. 59254 ACME POWER, 1-5 RH
THREAD, 2" / REV. LEAD, 2.11 LBS/FT.
CUT TO LENGTH AND DRILL
AS INDICATED.

NO. 89369 PLASTIC NUT.

DRIVE TORQUE RATIO:

AGAINST LOAD: 0.10 IN.-LB/LB.

WITH " 0.036 IN.-LB/LB

MAX. WORKING LOAD: 2000 LBS.

JOINTHORUP

IRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

POWER SCREW &

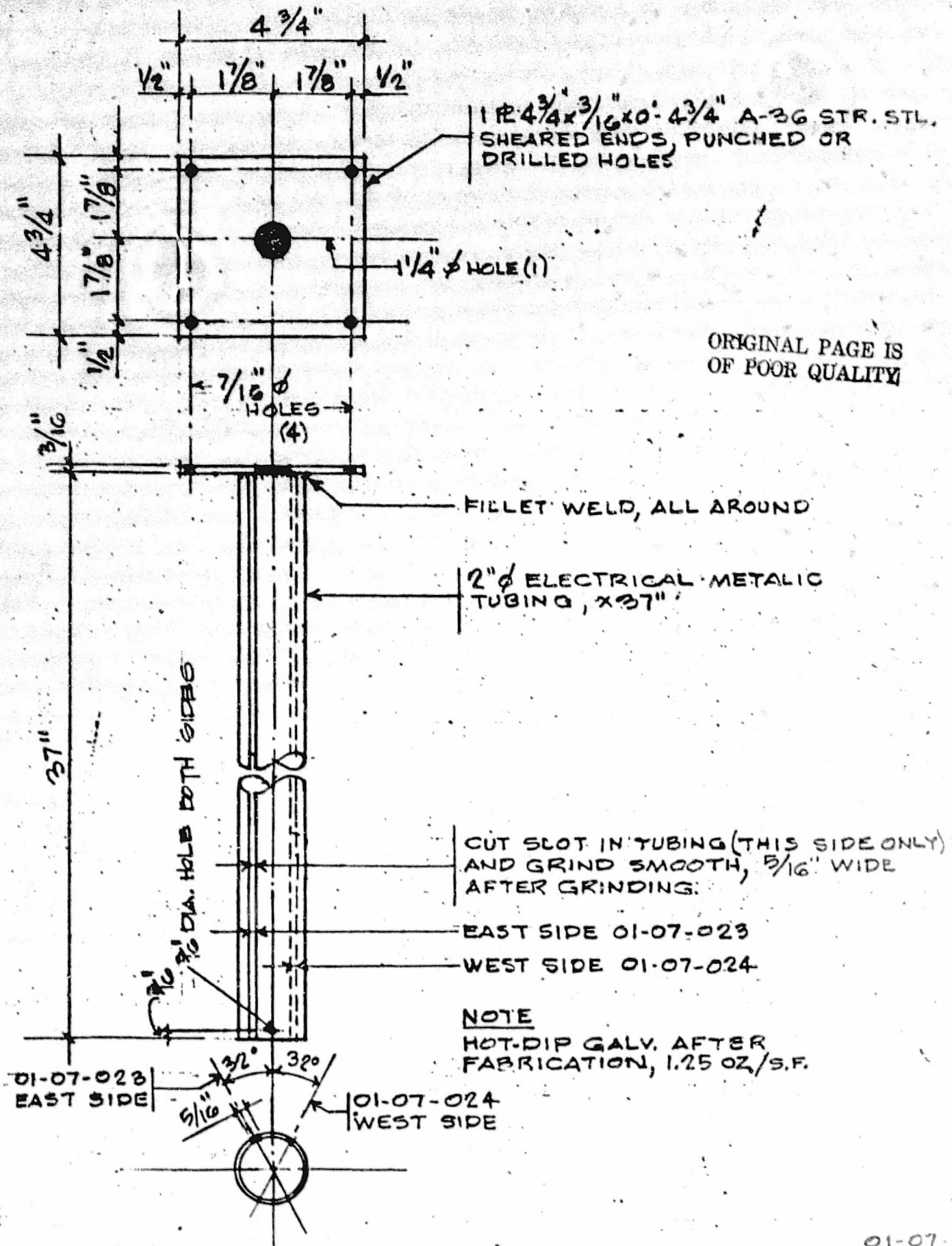
NUT-TRK CONT'L BOX

01-03-069

01-18-010

DRN FW CHK

3/4/78 REV.



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NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

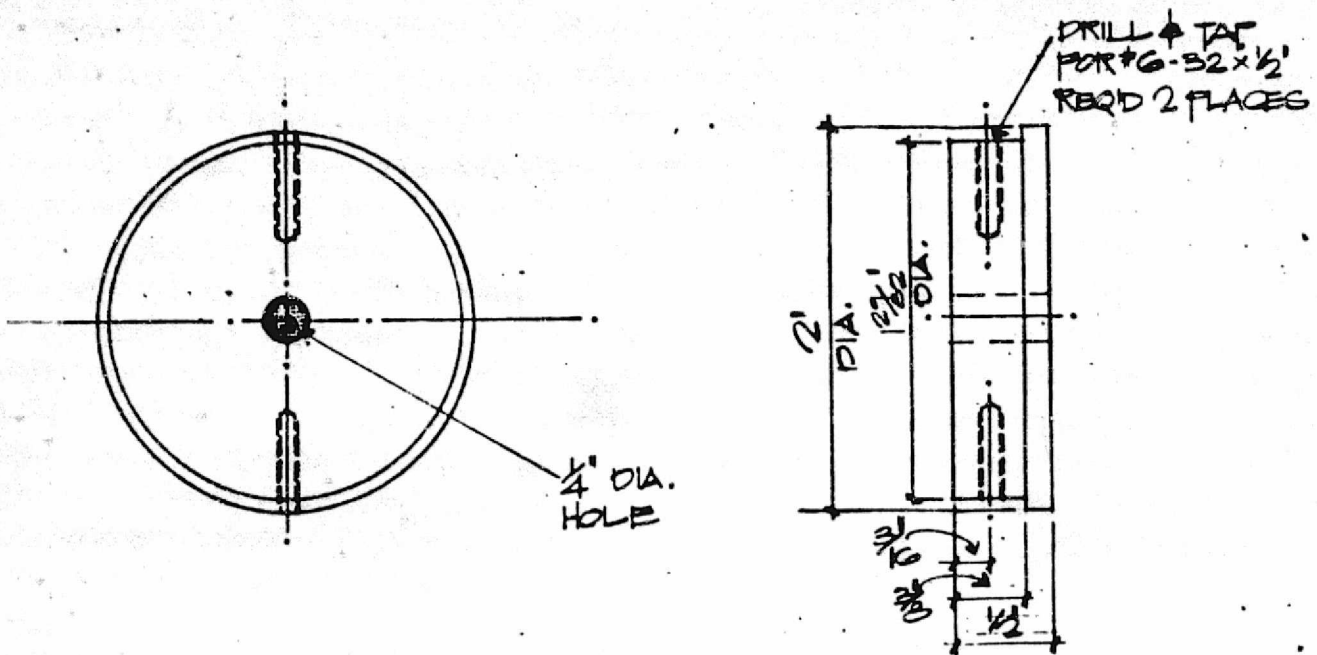
HOUSING-POWER
SCREW, TRK. CONTRL
BOX: 01-07-069

01-07-023

01-07-024

DRN FW CNA

3/14/78



CABLE GUIDE

'DELKIN' PLASTIC (DU-PONT) #500
2 EQ. REQ'D PER ASS'Y

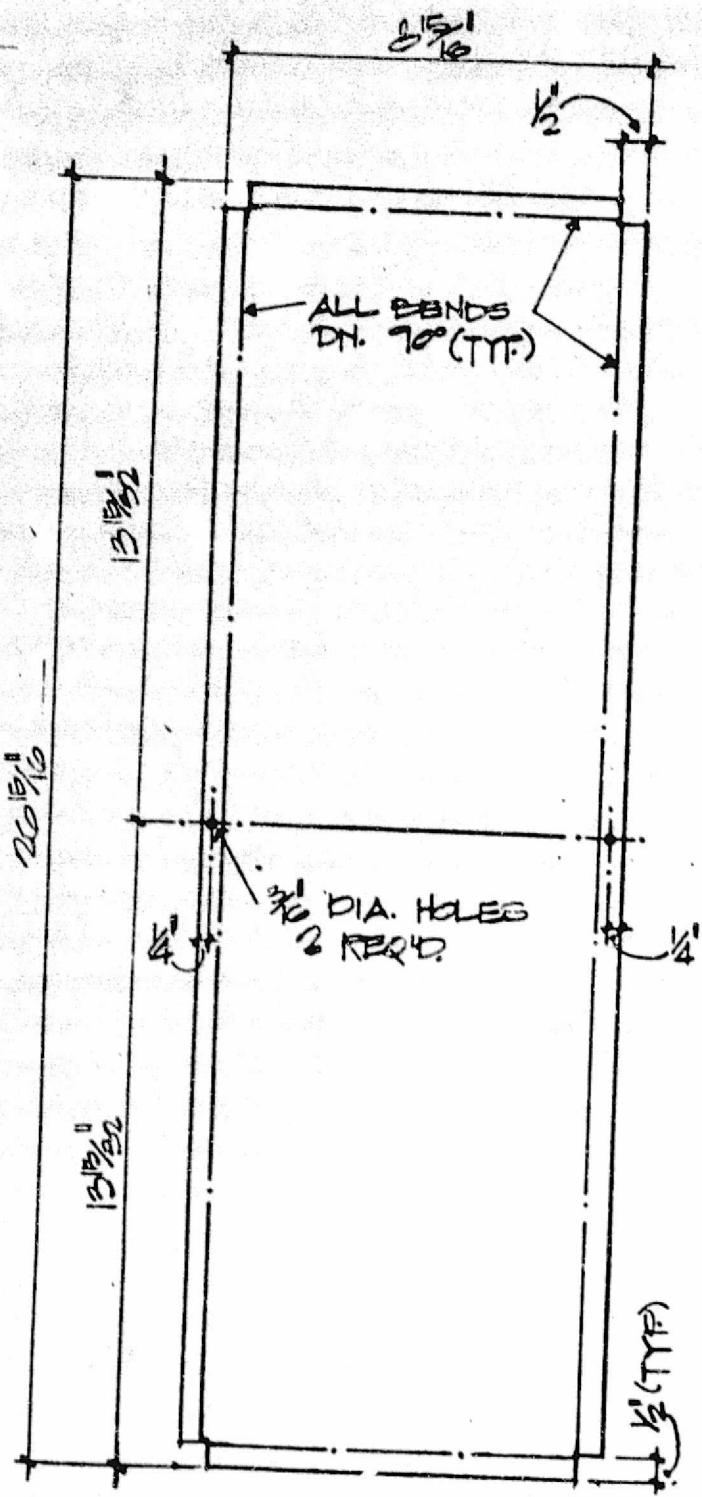
WORTHINGTON

WIP INCORPORATED 302 Nichols Drive, Milford, Texas 75455

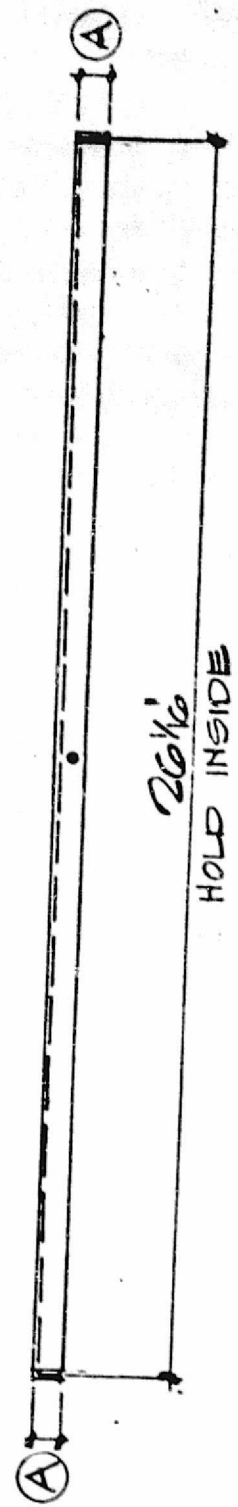
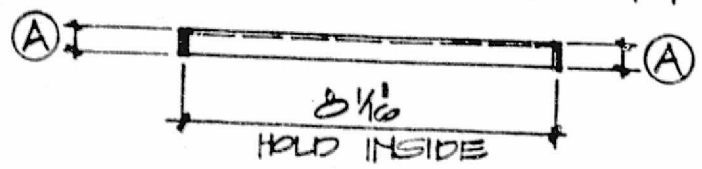
CABLE GUIDE

01-B-C14

DRN	RDS	CHK	FW
			REV



MAKE ALL (A) DIMS. EQUAL $\frac{3}{4}$ " $\pm$ OUT TO OUT



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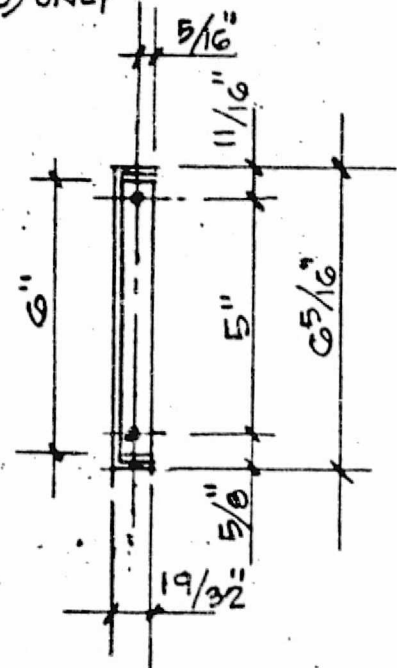
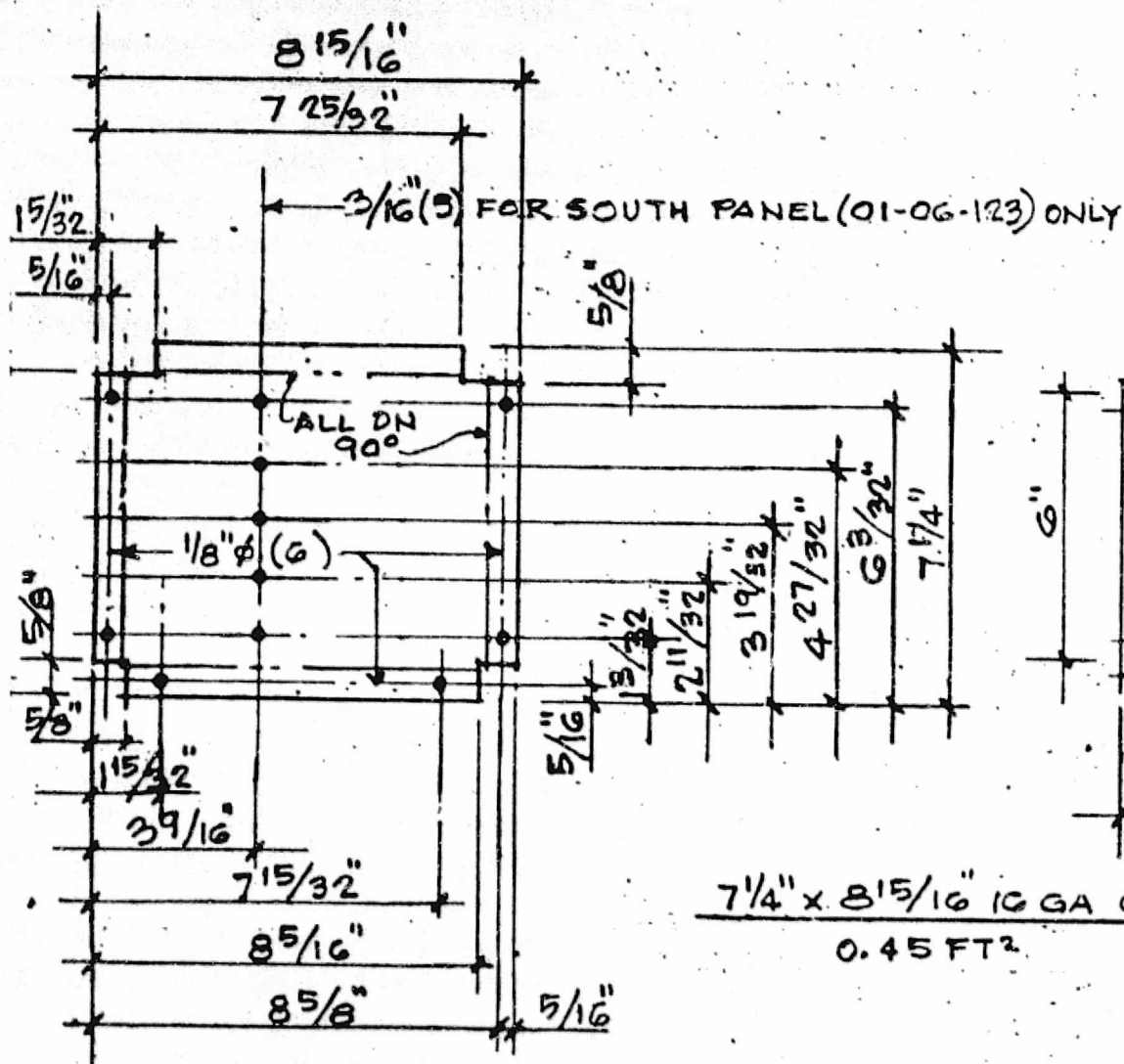
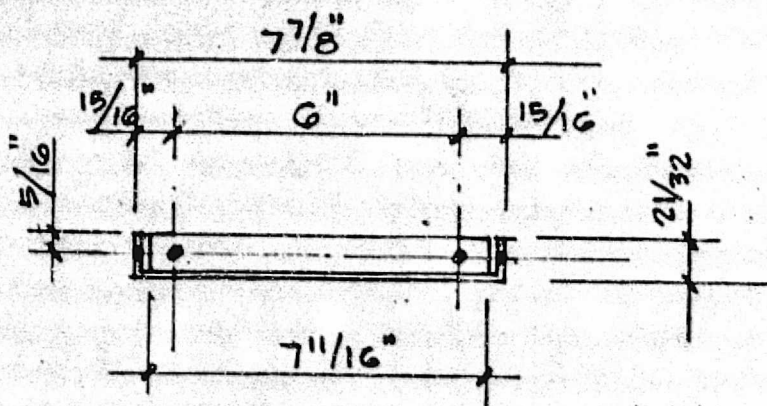
COVER

- TRACKING CONTROL BOX
100% GALV. STL. (01-001)
8 15/16" x 26 15/16" 1.67 FT²
ALL BENDS 90°
1. BRAZE ALL CORNERS
2. PAINT BRASSING WITH .002"
P. .002" COATING OF Z.R.C.
ZINC COATING PER MFG.
SPECS

NORTHROP
NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

COVER FOR
TRACKING CONTROL BOX
01-03-007

01-06-133		
DRN	REV	CHK
3-23-70		FW
	REV	



7 1/4" x 8 15/16" 10 GA GALV STL (01-001)
0.45 FT²

SOUTH 01-06-123
NORTH 01-06-124

NORTHROP

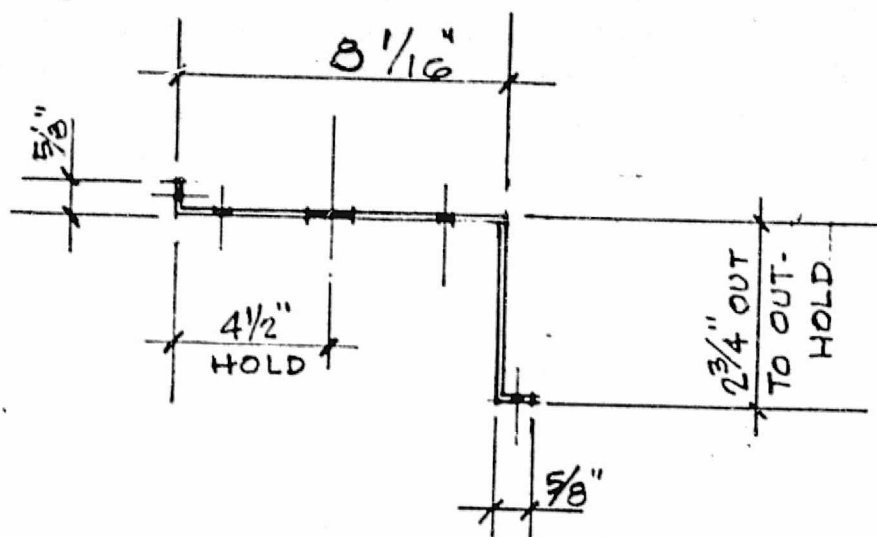
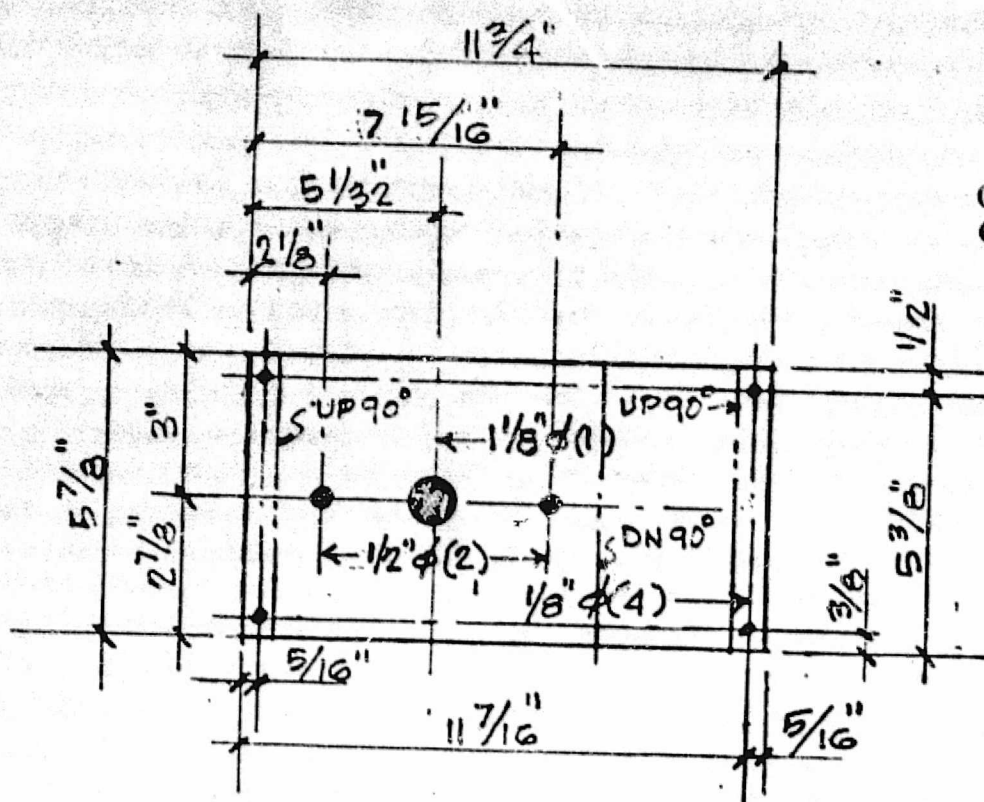
IRTHRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

END PANEL - N & S
TRK CTR'L BOX

01-03-069

01-06-123	01-06-124
DRN	FW
CHK	REV
3-13-72	REV

ORIGINAL PAGE IS
OF POOR QUALITY



$11\frac{3}{4}" \times 5\frac{7}{8}"$ 16 GA. GALV STL. (01-001)
0.48 FT²

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

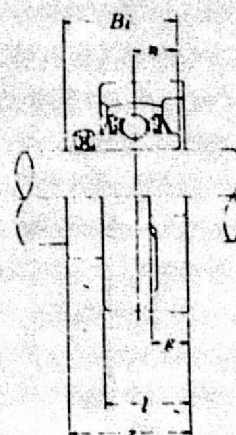
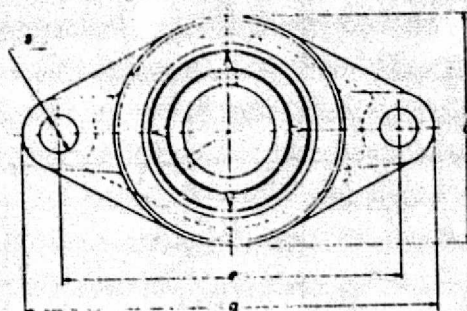
BRACKET-BEARING
TRK'G CONTR BOX
(01-03-069)

01-06-125

DRN FW CR

3-13-78 REV

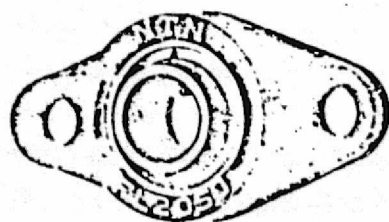
Set Screw Type
Normal Duty



Shaft Dia. in.	Complete Flanged Unit Number	Nominal Dimensions in.									Bearing Number	Basic Load Rating lbs.		Housing Number
		a	c	e	l	s	b	z	Bi	n		Dyn. C	Static Co	
1 1/4	UCFL 209-1 1/2 G(6)	7 3/8	5 3/8	2	1 1/2	.57	4 1/4	2.06	1.937	.748	UC 209-1 1/2	5650	4000	FL209G(6)

Set Screw

UCFL 2 (for light load)



UCFL

The bearing housing, each side thereof being rhombic, is to be secured to the frame with two bolts. Its form allowing side by side mounting in a narrow space, this type is recommended where a limit is set on the mounting pitch.

REF. 01-03-069

NORNEORLOP

THRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

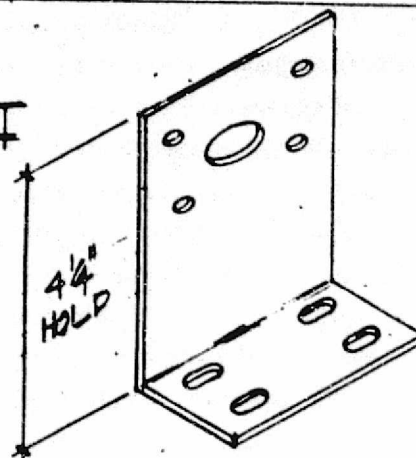
CONTROL BOX
BEARINGS

01-17-118

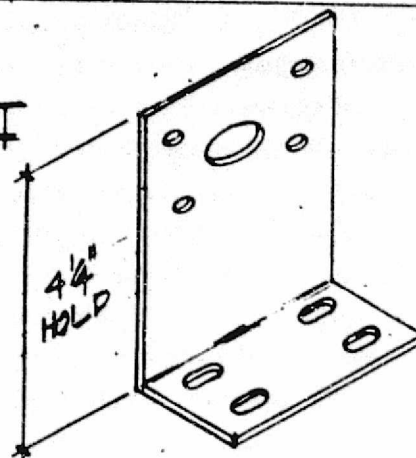
DRN [] CHK

1.00-20 INEV

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OF POOR QUALITY

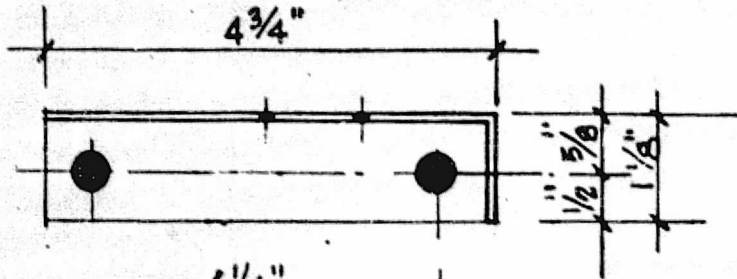
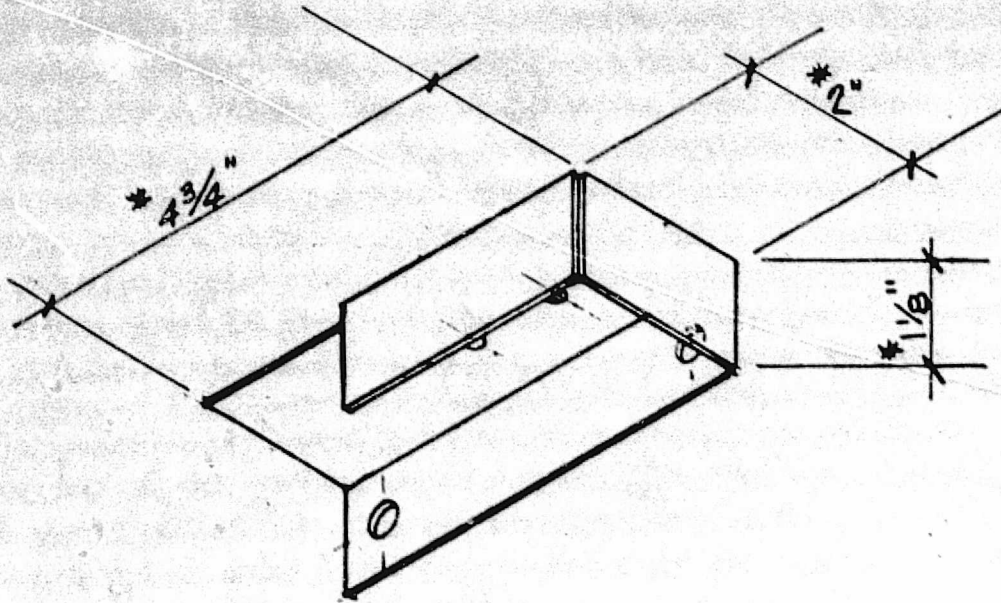


16 GA GALV. (01-01-001)
ALL BENDS 90°
BLANK = 3" x 5 1/8" .12 S.F.



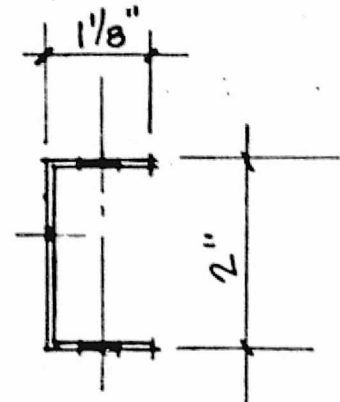
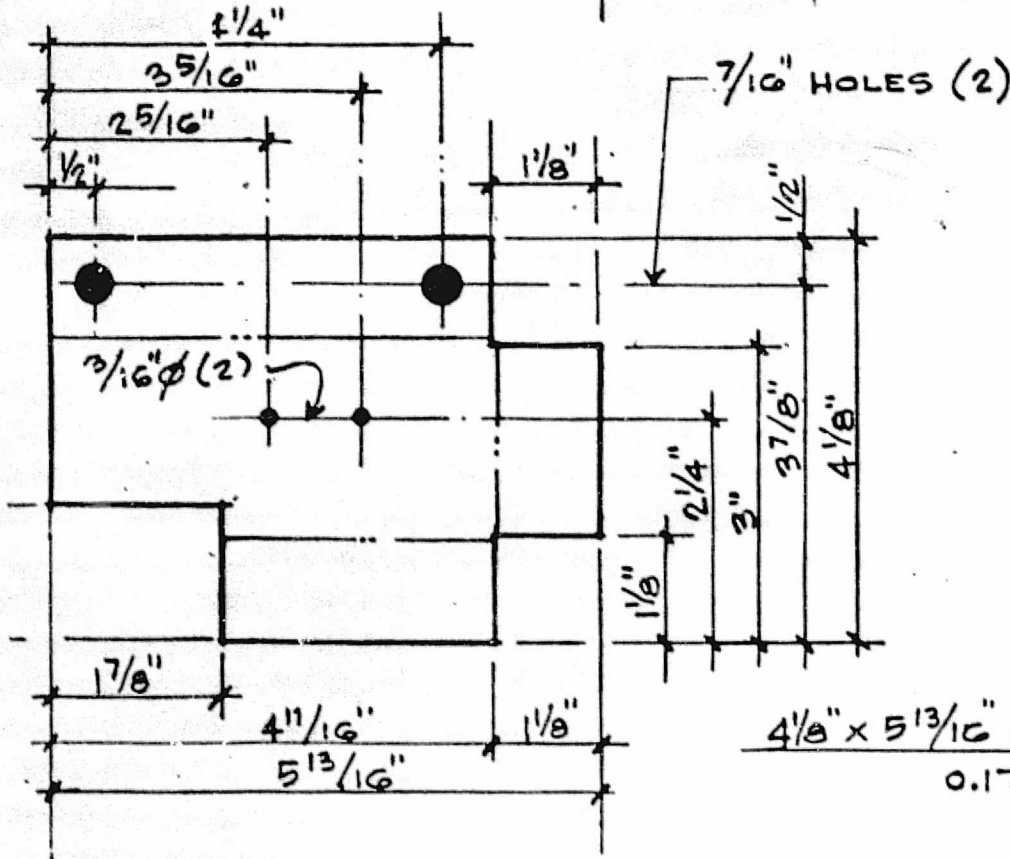
A	REV. MOTOR MTG. HOLES	4/14/85
01-06-136		
DRN	RDE	CHK FW
2 3 7 7	REV	

* OUT TO OUT DIMENSIONS



NOTE:

01-06-126 - WEST SIDE CONTROL
BOX AS SHOWN
01-06-127 - EAST SIDE CONTROL
BOX, BREAK OFF HAND



4 1/8" x 5 13/16" 20 GA GALV STL (01-01-002)
0.17 FT²

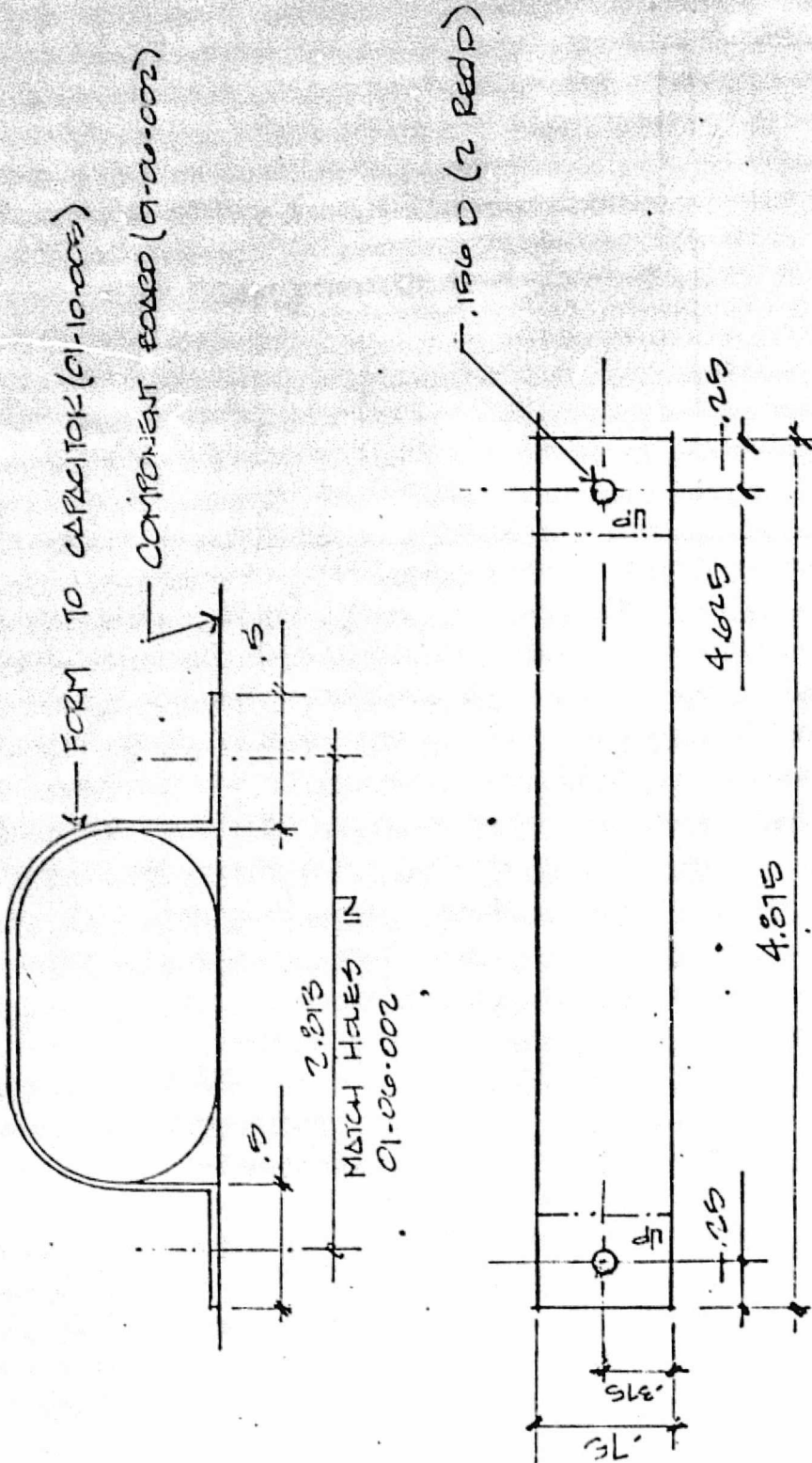
WORTH RUP

RUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

COVER-LIMIT SW.
TRK. CONTROL BOX
01-03-069

01-06-126	01-06-127
DRN	CHK
FW	REV
3-17-78	

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CAPACITOR MOUNTING STRAP

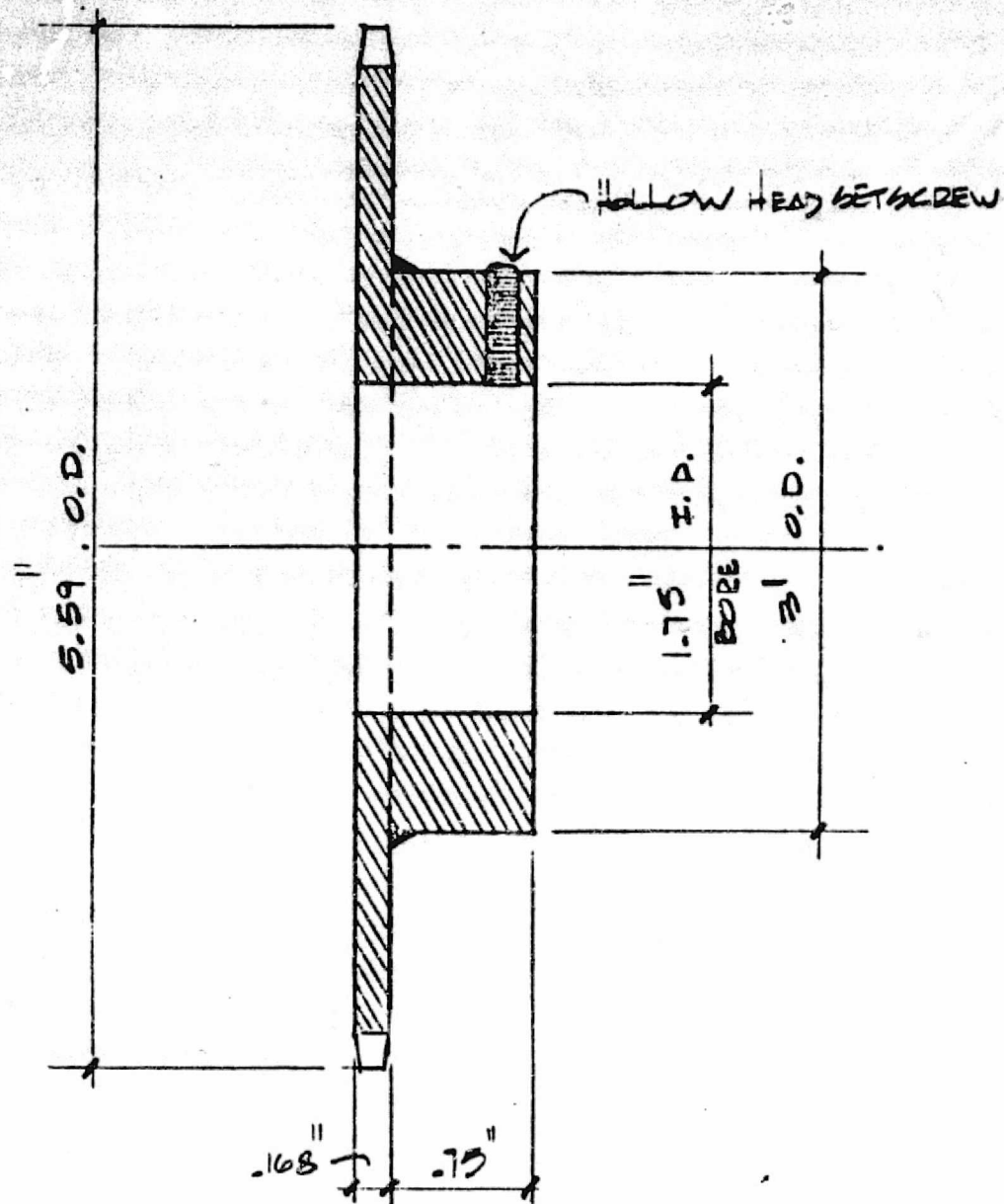
SEAL FULL SIZE
20 CAL. GAW. REED (01-01-002)
MATCH SIZE = .75 X 4.815
ALL BEHIND 90
REF. 01-00-002

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CAPACITOR MOUNTING
STRAP

01-00-009
REV B CHK
9-28-77 CEV



MATERIAL:

BROWNING STEEL TYPE "B"
 #35B45 1 3/4" BORE, 45 TEETH,
 SPROCKET W/ DET SCREW.
 TO BE USED W/ #35 AMERICAN
 STANDARD ROLLER CHAIN.
 REF. 01-03-069

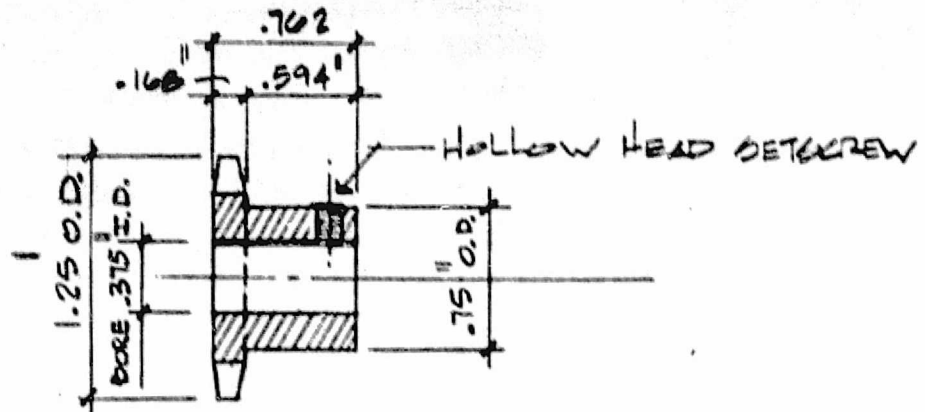
WORMHOLE

RUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CONTROL BOX
 DRIVE SPROCKET

01-17-120
 DRN 69 CHK
 4-26-78 REV

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SECTION

MATERIAL

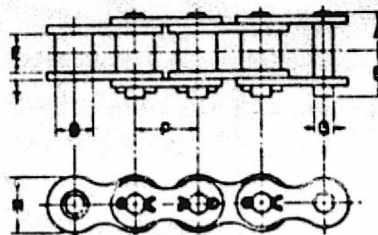
BROWNING #209 STEEL
SINGLE STRAND SPROCKET
W/9 TEETH AND 3/8" BORE.
ALSO W/ BETA SCREW.
TO BE USED W/ #35 AMERICAN
STANDARD ROLLER CHAIN.
REF. 01-03-009.

NORRISBORO

NORRISBORO, INCORPORATED 302 NORTH 4TH ST., FORT WORTH, TEXAS 76101

DRIVE MOTOR
SPROCKET

01-17-11
PBN 69 CLK
4-20-78 REV



Roller Chain

SINGLE STRAND CHAIN

Chain Pitch P	Chain No.	CHAIN		DIMENSIONS						
		Average Tensile Strength Lbs.	Average Weight per Ft. Lbs.	Connecting Links		Rollers		Pins	Side Plates	
				A	B	D	E	G	H	T
STANDARD										
• 3/8	35	2,100	.23	.223	.288	.200	3/16	.141	.343	.050



Single Strand—Riveted

MATERIAL

BROWN & POLVER CHAIN
NO 35 AMERICAN STANDARD

WORMHOLE

IUP, INCORPORATED 302 Nighth's Drive, Hutchins, Texas 75141

CONTROL 20x
DRIVE CHAIN

01-17-12
D.N.E. 29 C.K.
4-26-78 REV

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OF POOR QUALITY



F-345X
FILAMENT
TRANSFORMER
P.W. 115/230V
50/60 HZ
SEC. 24 VCT
C 10 A RMS
HORIZONTAL
CHANNEL
COUNTING

TRANSFORMER
REF. 01-02-002

NORTHROP
NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

TRANSFORMER
TEACHING MECHANISM

CH-001	CH-002
CH-003	CH-004
1-00-11	1-00-12

AMPHENOL Industries

SOLDER

WIRE WRAP

PRINTED CIRCUIT

TYPE "MIP" SOCKETS

High dielect. & bakelite body with molded in steel plate except (1)
 Metal-filled phenolic socket. *Requires 1/8" hole for mounting. All
 others mount in 1/8" hole. Ship wt. 2 oz.

X = 1/8" on MIP-4, 5, 6, 7, 8 & 9
 Y = 1/8" on MIP-10, 11, 12
 Z = 1/8" on MIP-13, 14, 15
 V = 1/8" on MIP-16, 17, 18
 W = 1/8" on MIP-19, 20
 U = 1/8" on MIP-21, 22

SOLDER TYPES

Socket No.	Type	Prepays	1-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400-449	450-499	500-549	550-599	600-649	650-699	700-749	750-799	800-849	850-899	900-949	950-999	1000-1049	1050-1099	1100-1149	1150-1199	1200-1249	1250-1299	1300-1349	1350-1399	1400-1449	1450-1499	1500-1549	1550-1599	1600-1649	1650-1699	1700-1749	1750-1799	1800-1849	1850-1899	1900-1949	1950-1999	2000-2049	2050-2099	2100-2149	2150-2199	2200-2249	2250-2299	2300-2349	2350-2399	2400-2449	2450-2499	2500-2549	2550-2599	2600-2649	2650-2699	2700-2749	2750-2799	2800-2849	2850-2899	2900-2949	2950-2999	3000-3049	3050-3099	3100-3149	3150-3199	3200-3249	3250-3299	3300-3349	3350-3399	3400-3449	3450-3499	3500-3549	3550-3599	3600-3649	3650-3699	3700-3749	3750-3799	3800-3849	3850-3899	3900-3949	3950-3999	4000-4049	4050-4099	4100-4149	4150-4199	4200-4249	4250-4299	4300-4349	4350-4399	4400-4449	4450-4499	4500-4549	4550-4599	4600-4649	4650-4699	4700-4749	4750-4799	4800-4849	4850-4899	4900-4949	4950-4999	5000-5049	5050-5099	5100-5149	5150-5199	5200-5249	5250-5299	5300-5349	5350-5399	5400-5449	5450-5499	5500-5549	5550-5599	5600-5649	5650-5699	5700-5749	5750-5799	5800-5849	5850-5899	5900-5949	5950-5999	6000-6049	6050-6099	6100-6149	6150-6199	6200-6249	6250-6299	6300-6349	6350-6399	6400-6449	6450-6499	6500-6549	6550-6599	6600-6649	6650-6699	6700-6749	6750-6799	6800-6849	6850-6899	6900-6949	6950-6999	7000-7049	7050-7099	7100-7149	7150-7199	7200-7249	7250-7299	7300-7349	7350-7399	7400-7449	7450-7499	7500-7549	7550-7599	7600-7649	7650-7699	7700-7749	7750-7799	7800-7849	7850-7899	7900-7949	7950-7999	8000-8049	8050-8099	8100-8149	8150-8199	8200-8249	8250-8299	8300-8349	8350-8399	8400-8449	8450-8499	8500-8549	8550-8599	8600-8649	8650-8699	8700-8749	8750-8799	8800-8849	8850-8899	8900-8949	8950-8999	9000-9049	9050-9099	9100-9149	9150-9199	9200-9249	9250-9299	9300-9349	9350-9399	9400-9449	9450-9499	9500-9549	9550-9599	9600-9649	9650-9699	9700-9749	9750-9799	9800-9849	9850-9899	9900-9949	9950-9999	10000-10049	10050-10099	10100-10149	10150-10199	10200-10249	10250-10299	10300-10349	10350-10399	10400-10449	10450-10499	10500-10549	10550-10599	10600-10649	10650-10699	10700-10749	10750-10799	10800-10849	10850-10899	10900-10949	10950-10999	11000-11049	11050-11099	11100-11149	11150-11199	11200-11249	11250-11299	11300-11349	11350-11399	11400-11449	11450-11499	11500-11549	11550-11599	11600-11649	11650-11699	11700-11749	11750-11799	11800-11849	11850-11899	11900-11949	11950-11999	12000-12049	12050-12099	12100-12149	12150-12199	12200-12249	12250-12299	12300-12349	12350-12399	12400-12449	12450-12499	12500-12549	12550-12599	12600-12649	12650-12699	12700-12749	12750-12799	12800-12849	12850-12899	12900-12949	12950-12999	13000-13049	13050-13099	13100-13149	13150-13199	13200-13249	13250-13299	13300-13349	13350-13399	13400-13449	13450-13499	13500-13549	13550-13599	13600-13649	13650-13699	13700-13749	13750-13799	13800-13849	13850-13899	13900-13949	13950-13999	14000-14049	14050-14099	14100-14149	14150-14199	14200-14249	14250-14299	14300-14349	14350-14399	14400-14449	14450-14499	14500-14549	14550-14599	14600-14649	14650-14699	14700-14749	14750-14799	14800-14849	14850-14899	14900-14949	14950-14999	15000-15049	15050-15099	15100-15149	15150-15199	15200-15249	15250-15299	15300-15349	15350-15399	15400-15449	15450-15499	15500-15549	15550-15599	15600-15649	15650-15699	15700-15749	15750-15799	15800-15849	15850-15899	15900-15949	15950-15999	16000-16049	16050-16099	16100-16149	16150-16199	16200-16249	16250-16299	16300-16349	16350-16399	16400-16449	16450-16499	16500-16549	16550-16599	16600-16649	16650-16699	16700-16749	16750-16799	16800-16849	16850-16899	16900-16949	16950-16999	17000-17049	17050-17099	17100-17149	17150-17199	17200-17249	17250-17299	17300-17349	17350-17399	17400-17449	17450-17499	17500-17549	17550-17599	17600-17649	17650-17699	17700-17749	17750-17799	17800-17849	17850-17899	17900-17949	17950-17999	18000-18049	18050-18099	18100-18149	18150-18199	18200-18249	18250-18299	18300-18349	18350-18399	18400-18449	18450-18499	18500-18549	18550-18599	18600-18649	18650-18699	18700-18749	18750-18799	18800-18849	18850-18899	18900-18949	18950-18999	19000-19049	19050-19099	19100-19149	19150-19199	19200-19249	19250-19299	19300-19349	19350-19399	19400-19449	19450-19499	19500-19549	19550-19599	19600-19649	19650-19699	19700-19749	19750-19799	19800-19849	19850-19899	19900-19949	19950-19999	20000-20049	20050-20099	20100-20149	20150-20199	20200-20249	20250-20299	20300-20349	20350-20399	20400-20449	20450-20499	20500-20549	20550-20599	20600-20649	20650-20699	20700-20749	20750-20799	20800-20849	20850-20899	20900-20949	20950-20999	21000-21049	21050-21099	21100-21149	21150-21199	21200-21249	21250-21299	21300-21349	21350-21399	21400-21449	21450-21499	21500-21549	21550-21599	21600-21649	21650-21699	21700-21749	21750-21799	21800-21849	21850-21899	21900-21949	21950-21999	22000-22049	22050-22099	22100-22149	22150-22199	22200-22249	22250-22299	22300-22349	22350-22399	22400-22449	22450-22499	22500-22549	22550-22599	2260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WIRE SET
ELECTRICAL COMPONENT ASSEMBLY
REICH ASSOCIATES, INC.

ORIGINAL PAGE IS
OF POOR QUALITY

P. O. Box 73, Plano, Texas 75074

(214) 424-7904

October 27, 1977 Rev. 1(11/11/77) Rev. 2(11/18/77), Rev. 3(12/12/77)Rb
Rev. 4(3/38/78) FW

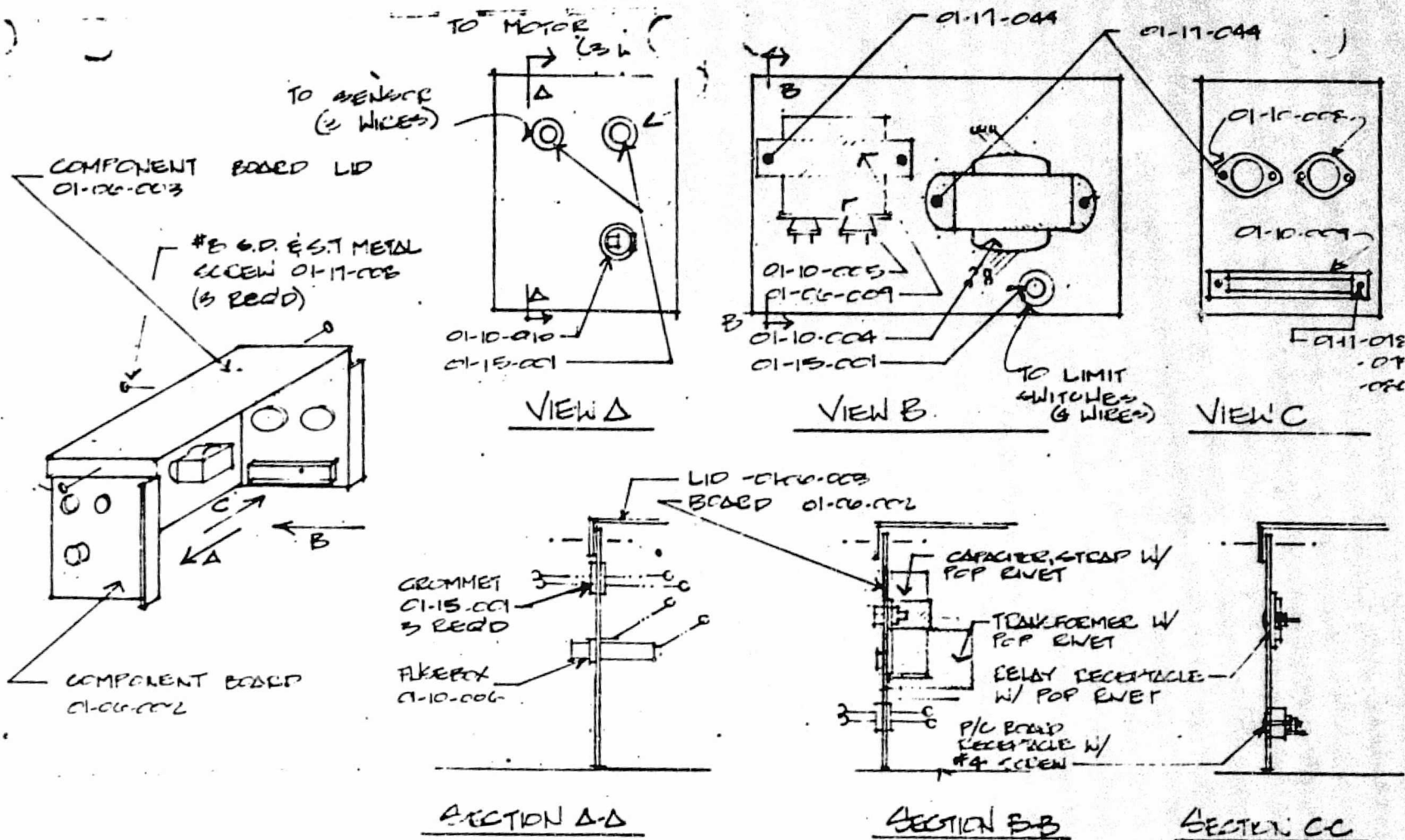
Model 10062

Cut Wire List Racker Electronics Sub Assembly

WIRE NO.	QUANTITY	COLOR	LENGTH	REMARKS	FROM	TO
1	1	Black	10"		Inside	Outside 120V
2	1	Black	9"		F1/2	J2/1
12	1	Black	26"		J1/1	Outside Solar Sensor
22	1	Black	5"		J2/3	J3/1
8	1	Black	15"		TP1	Outside(motor)
5	1	Blue	10"		Inside	Outside 120V
13	1	Orange	26"		J1/2	Outside Solar Sensor
14	1	Blue	26"		J1/3	Outside Solar Sensor
18	1	Blue	18"	Flag 1 End	J2/2	Outside Limit Switch
21	1	Blue	5"		J2/7	J1/12
15	1	Green	5"		J1/4	JP2
16	1	Green	21"	Flag 1 End	TP2	Outside Limit Switch
19	1	Red	21"	Flag 1 End	J3/2	Outside Limit Switch
20	1	Red	5"		J3/7	J1/6
23	1	Yellow	15"	Flag 1 End	C1/1	Outside(motor)
24	1	Yellow	8"	Flag 1 End	J2/6	C1/1
25	1	Red	15"	Flag 1 End	C1/2	Outside(motor)
26	1	White	8"	Flag 1 End	J3/6	C1/2
17	1	Green	18"	Flag 1 End	TP2	Outside Limit Switch

NOTE: All wire 18 gauge. Cut to specified length and strip ends

NORTHROP

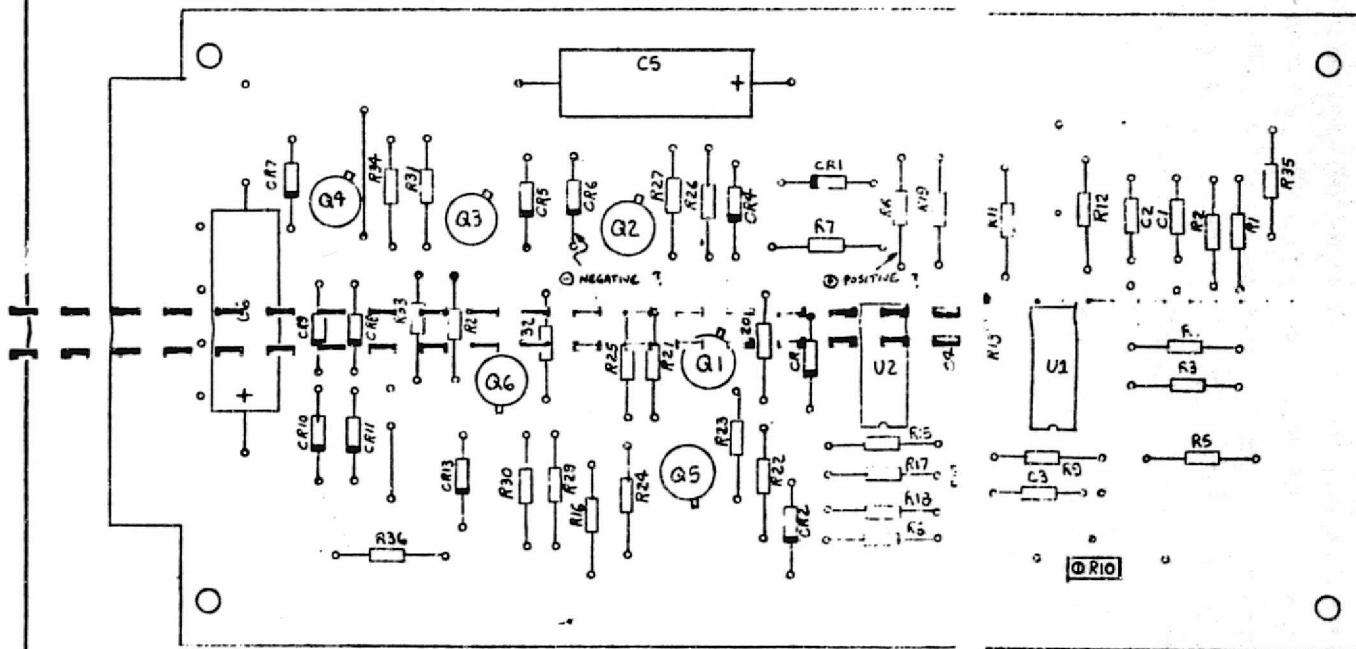
SHOP AIR ASSEMBLY
ELECTRICAL COMPONENT01-02-002
Rev. 11
11-28-71

SHOP SUBASSEMBLY - ELECTRICAL COMPONENTS BOARD -

BILL OF MATERIALS PER ASSEMBLY

QTY	PART #	DESCRIPTION	QTY	PART #	DESCRIPTION
1	01-06-002	COMPONENT BOARD	1	01-10-005	CAPACITOR
1	01-06-003	COMPONENT BOARD LID	1	01-10-004	TRANSFORMER
3	01-17-005	#8 SHEET METAL SCREWS	1	01-10-006	RELAY SOCKET
1	01-10-010	FUSE	2	01-10-009	P/C BOARD CONNECTOR
3	01-15-001	WIRE GROMMET RUBBER	1	01-10-006	FUSEHOLDER
9	01-11-044	POP RIVETS 1/8 DIA	2	01-11-013	#4 x 1/2 (40 TPI) SCREW
1	01-02-013	WIRE SET	2	01-11-011	#4 NUT (40 TPI)
			2	01-11-020	#4 LOCKWASHER

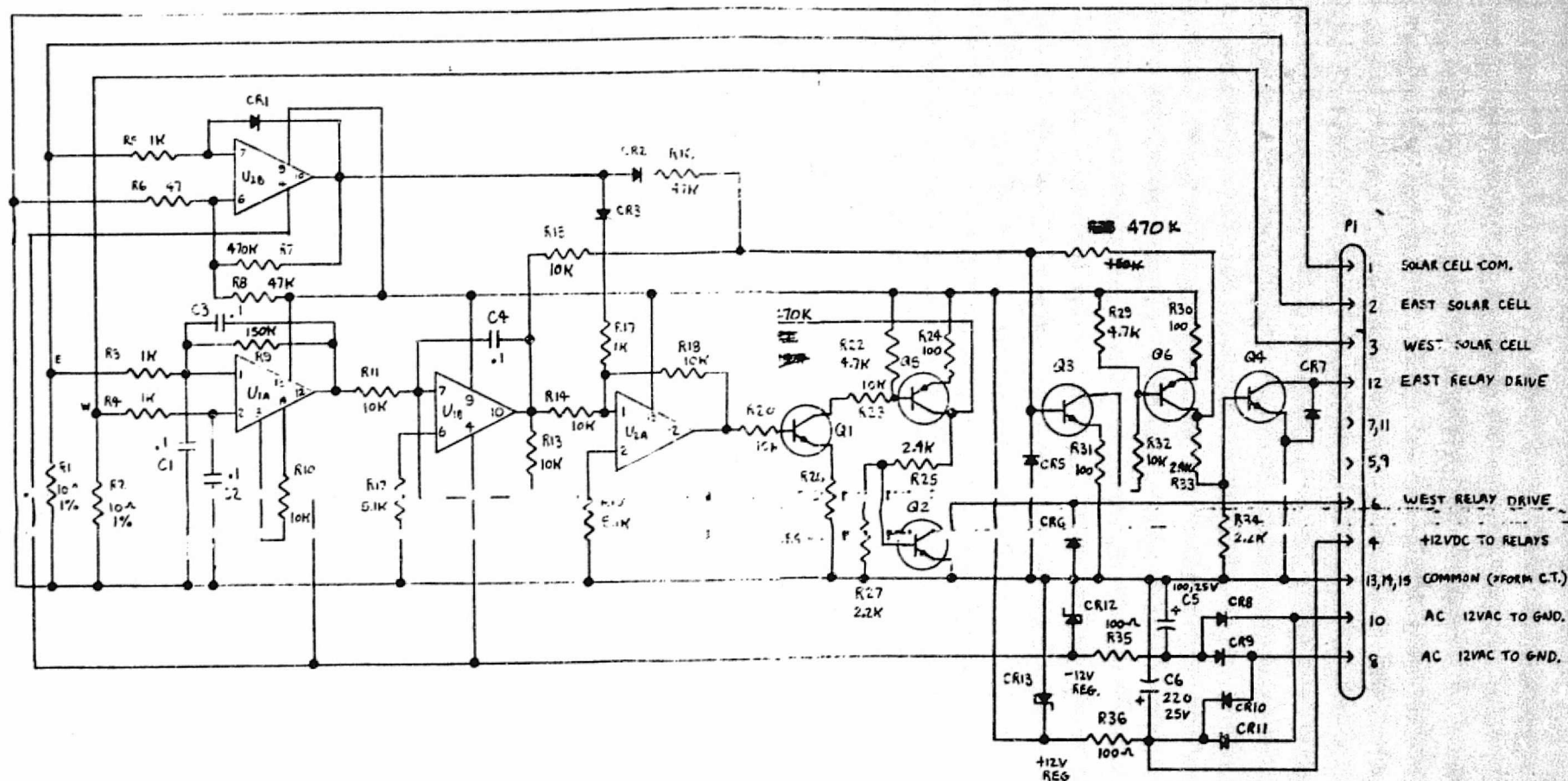
REVISION
Δ REDESIGN
1-6-73 CB



ORIGINAL PART
OF POOR QUALITY

NORTHTRUP
NORTHTRUP, INCORPORATED 222 NORTH DALLAS, DALLAS, TEXAS 75201

REICH ASSOCIATES, INC. Plano, Tx.		
SCALE: N/A	APPROVED BY: ER	DRAWN BY: ER
DATE: 7/29/77		REVISED:
TRACKING SYSTEM P/C BOARD ASSEMBLY		
DRAWING NUMBER: 01-10-002		1



(3) CNG. CONNECTOR NUMBERS.
(4) ADD IN4148 ACROSS EACH RELAY COIL.

U₁, U₂ CA747E

CR1-CR7 IN4148 or IN914; CR8-CR11 IN4004; CR12, CR13 IN4742

Notes: Last R36, C6, CR13, U2, PI, Q6

NORTHROP

NORTHROP, INCORPORATED 225 MAIN ST. NORTH, TEXAS 75411

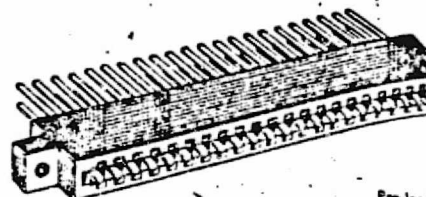
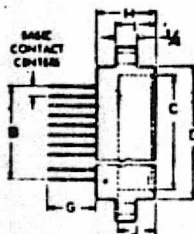
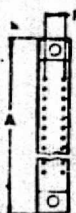
REVISIONS				Reich Associates Inc. Plano, Tx.	
NO.	DATE	BY	REASON	DATE	BY
1	10/10/77	ER	TRACING SYSTEM P/C		
2	10/27/77	ER	BOARD WIRING DIAGRAM		
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
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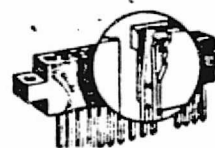
Printed Circuit Connectors

SERIES 261 WIRE-WRAP PC CONNECTORS



.100" CENTER

Stock No.	Type	No. Contacts	Dimensions											EACH				
			A	B	C	D	E	F	G	H	I	J	K	1-49	50-99	100-249	250-999	1000-UP
39F3350261-10015-2	15	2.474	1.400	1.720	8.742	1.54								2.44	2.05	1.72	1.47	1.30
39F3351261-10018-2	18	2.774	1.700	2.020	1.742	1.55								2.80	2.34	1.97	1.69	1.49
39F3352261-10022-2	22	3.174	2.100	2.420	2.574	2.56								3.27	2.74	2.29	1.97	1.74
39F3353261-10030-2	30	3.974	2.900	3.220	3.374	3.56	200	627	735	494	465	345		4.09	3.42	2.87	2.46	2.18
39F3354261-10036-2	36	4.574	3.500	3.820	3.974	4.256								4.75	3.97	3.38	2.86	2.53
39F3355261-10043-2	43	5.274	4.200	4.520	4.674	4.956								5.52	4.62	3.88	3.32	2.95



Basic Contact Centers

Pre-load Contact Centers

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81, 82

PC BOARD CONNECTORS
REF CI-02002
FROM NEWARK CATALOG

INCOIRN80R10P

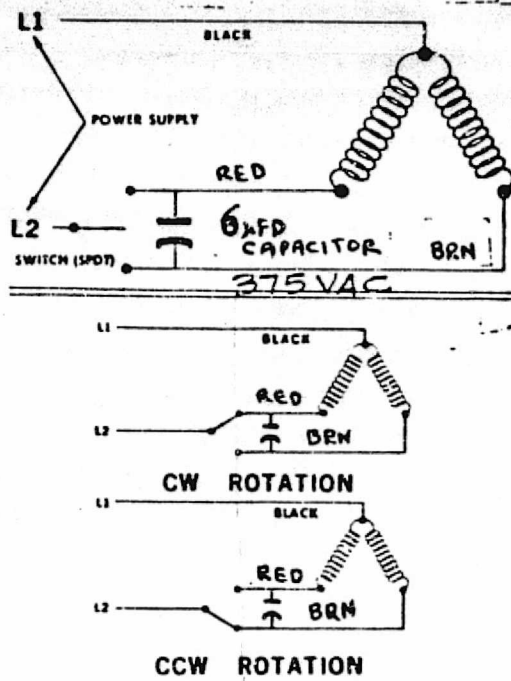
NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

PC BOARD CONNECTORS
TRACKING INFORMATION

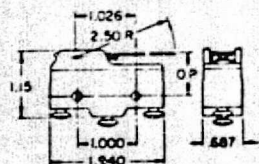
7-10-69
REV. 10-69
REV. 11-69

WIRING DIAGRAM

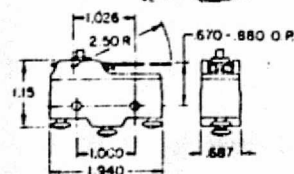
Connection for Clockwise (CW) or Counter-clockwise (CCW) rotation facing output shaft; connect 115 VAC, 60 Hz power supply as illustrated.



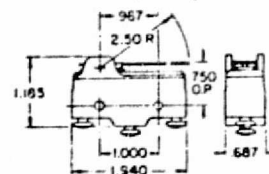
STYLE 21



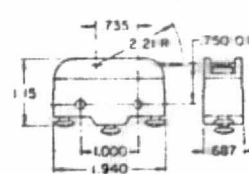
STYLE 22



STYLE 23



STYLE 24



ORDER GUIDE ROLLER LEVER

Characteristics: O.F. — Operating Force;
R.F. — Release Force; P.T. — Pretravel;
O.T. — Overtravel; D.T. — Differential Travel;
O.P. — Operating Position; F.P. — Free Position

Recommended For	Style No.	Electrical Data Ref.	Typical Catalog Listing	O.F. max. (ounces)	R.F. min. (ounces)	P.T. max. (inches)	O.T. min. (inches)	D.T. (inches)	O.P. (inches)	F.P. max. (inches)
Up to 20 ampere load handling	23	G	BA-2RV-A2	2.5	0.50	.625	.078	.109 max.	.750 ± .030	—
Up to 25 ampere load handling	23	H	BE-2RV-A4	2.5	0.50	.625	.078	.109 max.	.750 ± .030	—

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LIMIT SWITCH

REFER 01-02003

FROM MICRO SWITCH CATALOG

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NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75411

LIMIT SWITCH
TRACKING MECHANISM

01-10-007
REV 516
7-28-77
REV

Assembl.	Parts/ Assembl.	SHOP FINAL ASSEMBLY - PART		List of Materials	
		SHOP SUB-ASSEMBLY - PART		01-03-049	
		PART		Collector Housing Assembly	
		PART		1-31-78	
		REV		Lmt. 1 of 4	
PART. NO. / REV / DESCRIPTION					
	2	01-03-049	Collector Housing Assembly		
		01-06-040	Cover sides & bottom 42" X 133-5/8",		
			26 Ga. Galv. (01-001) 39.97 Ft2		
	54	01-17-008	#8 X 1/2 Screw Zinc Coated		
	116	01-06-061	Bridging Cross 16 Ga. Galv. Steel, 9/16"		
			X 15-1/2 (.061 Ft 2)		
	116	01-06-062	Bridging Top & Bottom, 16 Ga. Galv. Steel,		
			1-1/4" X 1-5/8" (-10 Ft2)		
	164	01-17-027	1/4 X 1/2 Bolt Zinc Coated		
	164	01-17-028	1/4 Nut, Zinc Coated		
	164	01-17-029	1/4 Lockwasher, Zinc Coated		
	24	01-06-109	Insulation Cap Fastener 2" X 40" (.55 Ft2)		
			20 Ga. Galv., 01-002		
	24	01-13-002	1" Thick RA-22 Owen Corning Fiberglass		
			Insulation, 4 pcs - 19-3/4 X 44", 8 pcs -		
			19-3/4 X 42-1/2" and 12 pcs - 12" X 44-3/16"		
	1	01-13-004	Batt Insulation Owen Corning AFU - Solar		
			1000° (52 cu. ft. reg.)		
	1	01-13-005	1/4 X 2-1/2 X 6 DuPont Micro Form Insulation		
	1	01-13-006	1/4 X 2-1/2 X 3-7/8 DuPont Micro Form		
			Insulation		
	2	01-13-007	1" Thick Smooth Foil Back Duct Board		
			Insulation, 4 pcs @ 9-5/8" X 16" and 4 pcs		
			@ 9-5/8" X 14"		
	72	01-17-008	No. 8 X 1/2 Screws, Zinc Coated		
	1	01-21-006	Silicon Sealant GE RTV or Equal		
2		01-02-007	End Beam Sub-Assembly		
	2	01-06-028	End Beam 16 Ga. Galv. Steel, 16-1/4 X 58-5/16"		
			(6.58 Ft 2)		
	B	01-06-027	End Strut 20 Ga. Galv. Steel 4-1/16" X 11"		
			(.3 Ft2)		
	4	01-06-051	End Strut 20 Ga. Galv. Steel 4-1/16" X 1"		
			(.028 Ft2)		
	30	01-17-008	#8 X 1/2 Screw, Zinc Coated		
1		01-02-010	Flanged Shaft Assembly - North End		
	1	01-07-017	Flange ASTM, A36 Stl 1/4" Thick Plate		
	1	01-18-005	Flanged Shaft, 1-1/2 O.D. X .109 Wall Thk. Cold		
			Drawn Seamless Tube 3-7/8" Length, North		
	6	01-17-010	Bolt, 3/8 X 3/4, Zinc Coated		
	6	01-17-011	Nut, 3/8, Zinc Coated		
	6	01-17-012	Lockwasher 3/8, Zinc Coated		
1		01-02-011	Flanged Shaft Assembly - South End		
	1	01-07-017	Flange ASTM A36 Stl, 1/4" Thick Plate		
	1	01-18-006	Flanged Shaft, 1-1/2 O.D. X .109 Wall Thk, Cold		
			Drawn Seamless Tube 2-1/2 Length, South		
	6	01-17-010	Bolt, 3/8 X 3/4, Zinc Coated		
	6	01-17-011	Nut, 2/8 Zinc Coated		
	6	01-17-012	lockwasher, 2/8, Zinc Coated		
2		01-02-019	Collector Truss (interior) Sub-Assembly		
2		01-06-138	Lens Guide 20 Ga. Galv Steel 3-7/16" X 3"		
			(.072 Ft2)		
4		01-06-029	Lens Guide 20 Ga. Galv. Steel 3-5/8" X 6 13/16"		
			(1.681 Ft2)		
16		01-06-024	Web Member (wide) 20 Ga. Galv. Steel 3-7/16" X		
			13-9/16" (.32 Ft2)		

Assembly

Parts/
Assembly

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

List of Materials

01-03-049

Collector Housing Assem 1y

1-31-78

REV

LMT. 2 CC 4

PART. NO. / REV / DESCRIPTION

14		01-06-025	Web Member (narrow) 20 Ga. Galv. Steel 3-3/8" X 13-9/16" (.32 Ft2)
4		01-06-026	Chord Top & Bottom 20 Ga. Galv. Steel 3-3/4" X 128-3/4" (3.353 Ft2)
3		01-06-063	Vertical Bridging 16 Ga. Galv. Steel 1-5/8" X 11" (.12 Ft. 2)
11		01-17-008	#8 X 1/2 Screw, Zinc Coated
3		01-17-057	Bolt, 1/4 X 2-1/4 Zinc Coated
3		01-17-028	Nut, 1/4, Zinc Coated
3		01-17-029	Lockwasher, 1/4, Zinc Coated
4		01-17-059	Spacer Bolt 1/4 X 1-13/16, Zinc Coated (01-311)
4		01-17-058	Spacer Bolt 1/4 X 1-11/16, Zinc Coated (01-311)
24		01-17-045	Pin, 1/4 X 2-1/4, Zinc Coated
24		01-17-056	Fastener Lock, 1/4 Tinnerman or Equal
2	01-02-020		Collector Truss (exterior) Sub-Assembly
2		01-06-138	Lens Guide 20 Ga. Galv. Steel 3-7/16 X 3" (.072 Ft2) ^{← SPLICE.}
4		01-06-029	Lens Guide 20 Ga. Galv. Steel 3-5/8" X 133-5/8" (3.36 Ft2)
16		01-06-024	Web Member (wide) 20 Ga. Galv. Steel 3-7/16" X 13-9/16" (.32 Ft2)
14		01-06-025	Web Member (narrow) 20 Ga. Galv. Steel 3-3/8 X 13-9/16" (.32 Ft2)
4		01-06-026	Chord Top & Bottom 20 Ga. Galv. Steel 3-3/4" X 128-3/4" (3.353 Ft2)
4		01-06-063	Vertical Bridging 16 Ga. Galv. Steel 1-5/8" X 11" (.12 Ft2)
11		01-17-008	#8 X 1/2 Screw, Zinc Coated
3		01-17-057	Bolt, 1/4 X 2-1/4, Zinc Coated
3		01-17-028	Nut, 1/4, Zinc Coated
3		01-17-029	Lockwasher, 1/4, Zinc Coated
4		01-17-059	Spacer Bolt 1/4 X 1-13/16, Zinc Coated
4		01-17-058	Spacer Bolt 1/4 X 1-11/16, Zinc Coated
24		01-17-045	Pin, 1/4 X 2-1/4, Zinc Coated
24		01-17-056	Fastener Lock, 1/4 Tinnerman or Equal
1	01-02-009		Torque Tube Assembly
1		01-06-138	Lens Guide Splice 20 Ga. Galv. Steel 3-7/16 X 3" (.072 Ft2)
2		01-06-029	Lens Guide, 20 Ga. Galv. Steel 3-5/8 X 133-5/8" (3.36 Ft2)
2		01-06-026	Chord Top & Bottom 20 Ga. Galv. Steel 3-3/4" X 128-3/4" (3.353 Ft2)
1		01-06-046	Torque Bar Right Side 16 Ga. Galv. Steel 6" X 133-15/16" (5.581 Ft2)
1		01-06-047	Torque Bar Left Side 16 Ga. Galv. Steel 6" X 133-15/16" (5.581 Ft2)
1		01-06-048	Torque Bar Bottom 16 Ga. Galv. Steel, 6" X 122-15/16 (5.581 Ft2)
16		01-06-049	Truss Connector Torque Bar Top 16 Ga. Galv. Steel 1-3/4" X 3-7/16" (.042 Ft2)
4		01-06-064	Bridging Connector Right Hand 16 Ga. Galv. Steel 1-5/8" X 1" (.011 Ft2)
4		01-06-079	Bridging Connector Left Hand 16 Ga. Galv. Steel 1-5/8" X 1" (.011 Ft2)

Assembly

Parts/
Assembly

FIELD SUB-ASSEMBLY - TAKI

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

List of Materials

01-03-049

Collector Housing Assembly

1-31-78

REV

GHT. 3 OF 4

PART. NO. / REV / DESCRIPTION

16	01-06-050	Truss Connector Torque Tube Bar, 16 Ga, Galv. Steel 1-3/4" X 5-9/16" (.068 Ft2)
145	01-17-008	#8 X 1/2 Screw, Zinc Coated
4	01-17-057	Bolt 1/4 X 2-1/4 Zinc Coated
4	01-17-028	Nut 1/4 Zinc Coated
4	01-17-029	Lockwasher 1/4, Zinc Coated
4	01-17-058	Spacer Bolt 1/4 X 1-11/16, Zinc Coated
12	01-17-045	Pin, 1/4 X 2-1/4, Zinc Coated
12	01-17-056	Fastener Lock 1/4 Tinnerman or Equal
1	01-02-01	Absorber Tube Sub-Assembly
2	01-08-020	Exterior Absorber Tube 1-1/8" ϕ X 131" Type "M" Cu, Tube
8	01-09-007	Cap 1-1/8 I.D., Cu, Tpe "M"
4	01-08-023	Exterior Manifold Pipe 5/8 ϕ X 6,131", Cu,
2	01-08-021	Interior Absorber Tube 1-1/8 ϕ X 131", Type "M", Cu, Tube 01-09-007 I.D.,
4	01-08-023	Exterior Manifold Pipe 5/8" ϕ X 6,131" Cu, Type "M" Tube
4	01-08-024	Interior Manifold Pipe 5/8 ϕ X 6,125", Cu, Type "M" Tube
2	01-09-019	Tee 1/2 X 1/2 X 1/2 WROT
2	01-08-027	Manifold Riser 5/8" ϕ X 2-23/32", Cu., Type "M" Tube
2	01-09-020	Elbow 1/2 WROT 90° Short rad.
1	01-08-025	Manifold Pipe North End 5/8" ϕ X 5", Cu., Type "M" Tube
1	01-08-026	Manifold Pipe South End 5/8 ϕ X 3,625" Cu, Type "M" Tube
2	01-09-022	Male Adapter 1/2 WROT
1	01-16-004	Selective Coating, Black Chrome, Olympic, NASA Spec.
8	01-06-111	Absorber Tube Retainer 16 Ga., Galv. Steel 2-3/16 X 4-1/2 (.068 Ft2)
8	01-17-063	Fastener Lock 1/4 X 4 Tinnerman or Equal
1	*01-10-018	High Limit Switch, Fenwal or Equal
1		10A 1205 A 240 VAC Non-Ind.
1	*01-10-019	High Limit Switch Bridge Fastener 1/2 X 2-1/2 3-3/16 Bakelite Board
1	*01-06-108	High Limit Switch - U-Fastener 16 Ga, Galv. Steel 2-3/8 X 2-1/2 (.041 Ft2)

* - Optional Equipment

Assembly

Parts/
Assembly

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

List of Materials

01-03-049

Collector Housing Assembly

1-31-78

REV

LHT. 4 OF

PART. NO. / REV / DESCRIPTION

*01-017-081 #6 X 32 X 1/2 Slotted Round head Screw,
Zinc Coated

*01-017-022 #6 X 32 Hex Nut Zinc Coated

*01-017-021 #6 Split Lockwasher, Zinc Coated

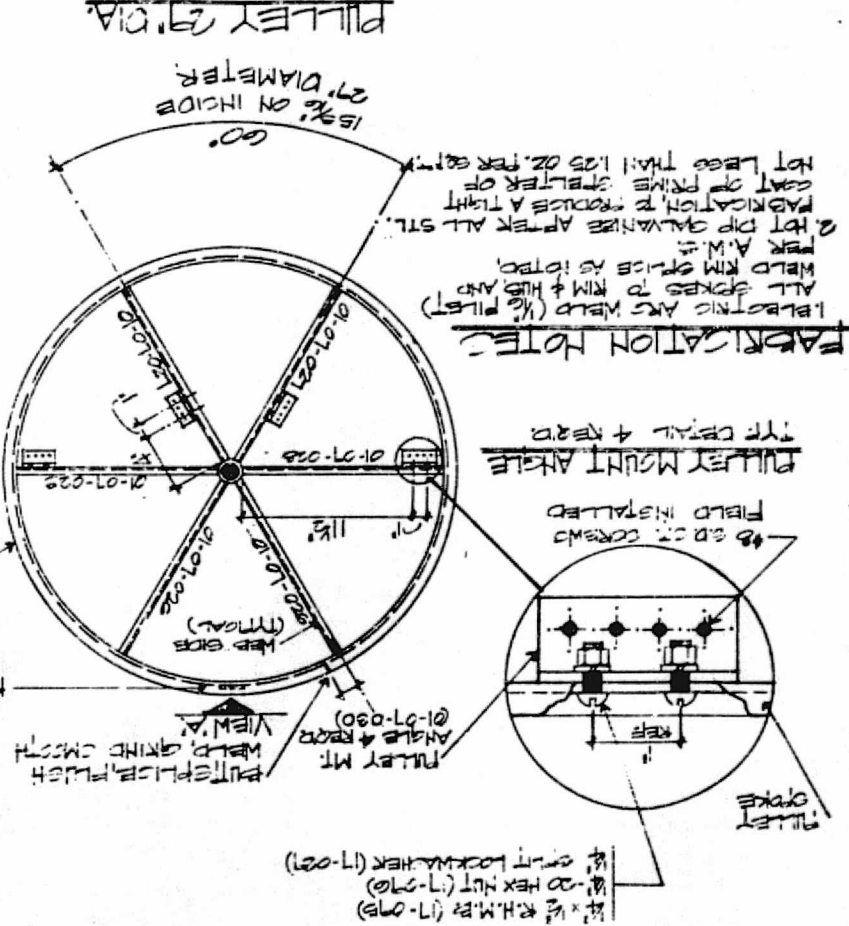
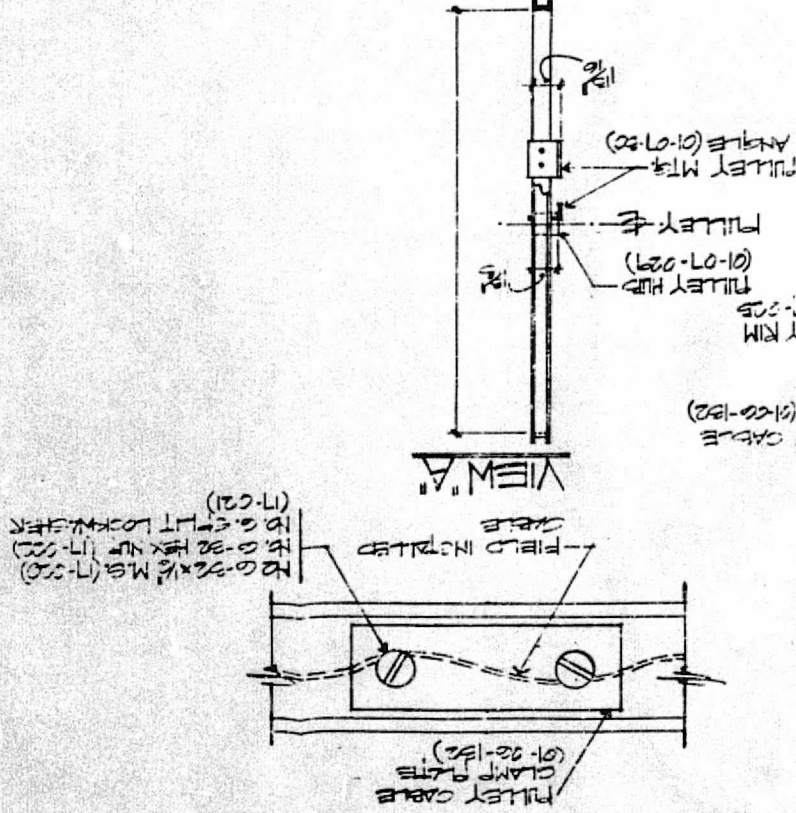
* - OPTIONAL EQUIPMENT

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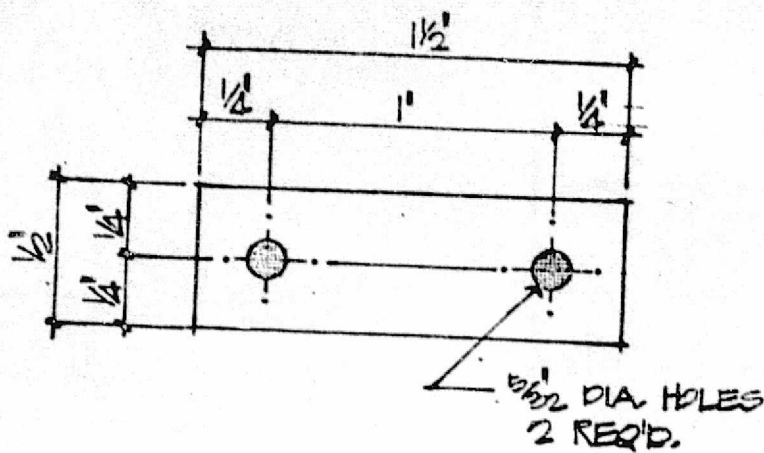
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PULLEY 2915A.

BILL OF MATERIAL		QTY	PART NO.	DESCRIPTION
2	17-22	40.00	22 HX-NUT	FLAT RIM
2	17-21	13.00	SHUT LOCKER KEY	TOP RULLEY STAKE
2		0.00		BOTTOM RULLEY STAKE
2		0.00		CON 2. RULLEY STAKE
1		0.00		RULLEY HUB
4		0.00		RULLEY MOUNT ANGLE
1		20.00		RULLEY CABLE CLAMP
8		11.00		WASH WASH SCREW
8		0.00		WASH WASH SCREW
3		0.00		WASH WASH SCREW
2		0.00		WASH WASH SCREW



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CABLE CLAMP

16 GA. GALV. STL. (01-001)
1/2" X 1 1/2" (.005 FT²)
SCALE: 1" = 1 1/2"

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NORTHROP

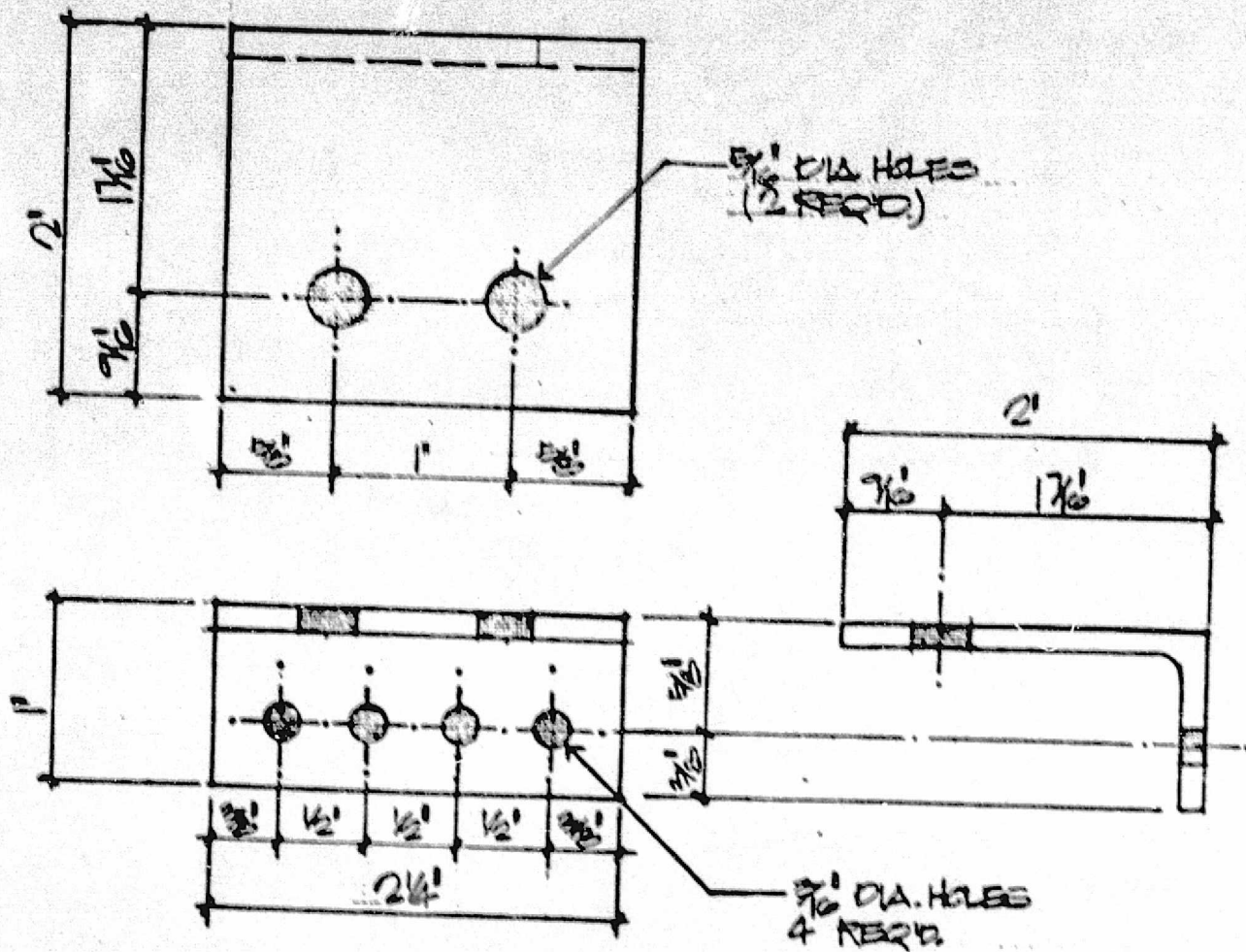
NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins Texas 75141

PULLEY CABLE
CLAMP PLATE

01-06-132

DRN	RE	CHK	FW

REV



PULLEY MOUNT ANGLE

2x1"x1/4"x2 1/4" ALUM. ANGLE (1-910)

COG-B-TB 0.491 LBS/FT. SQ. CORNERS

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

PULLEY MOUNT ANGLE

01-07-80

DRN RDS

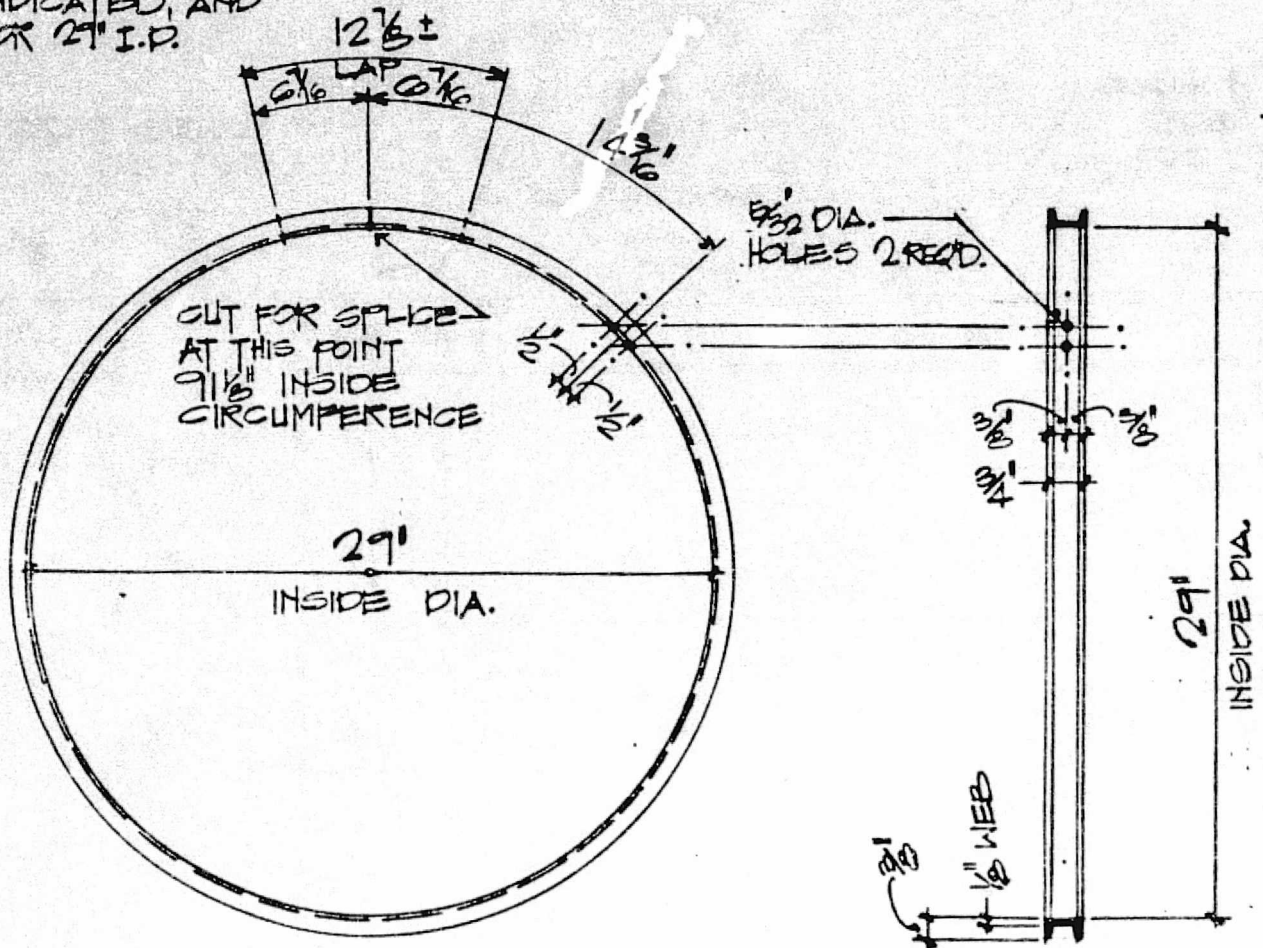
CHK FW

2 1/2 x 1/2 REV

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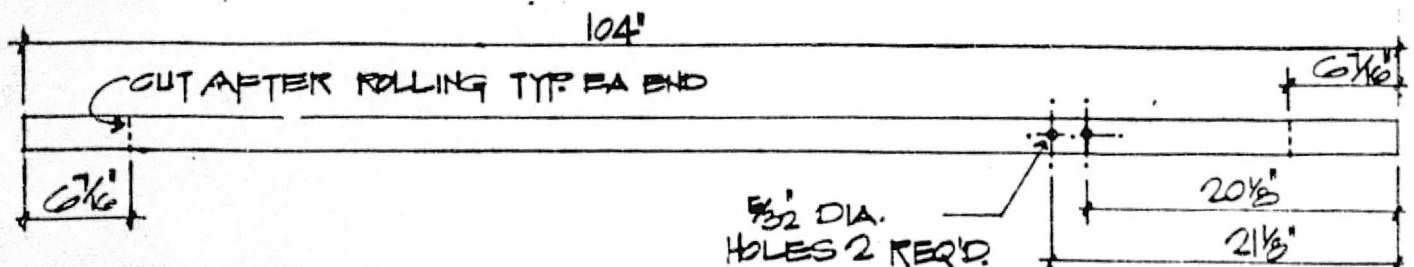
NOTE:

COLD ROLL CHANNEL
TO 29" INSIDE DIA.,
ALLOW TO OVERLAP
AS INDICATED, AND
CUT FOR 29" I.D.



PULLEY RIM

3/4" x 3/8" x 1/8" CHANNEL x 104" (01-010)
.54 LBS/FT. A-36 STR. STL.



NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

PULLEY RIM

01-07-025

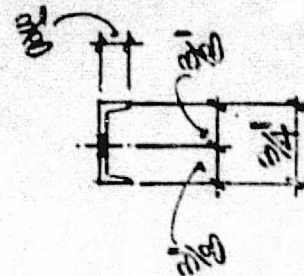
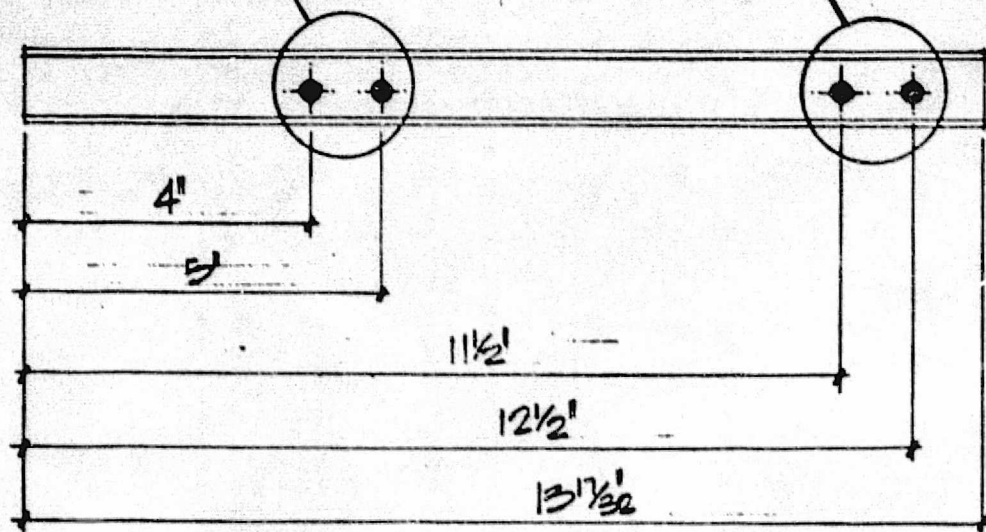
DRN RDS CHK FW

3-21-73 REV

$\frac{3}{16}$ " ϕ HOLES
 2 REQ'D.
 01-07-027
 ONLY

$\frac{3}{16}$ " ϕ HOLES
 2 REQ'D.
 01-07-028
 ONLY

NOTE:
 NO HOLES REQ'D
 IN 01-07-026



PULLEY SPOKE

$\frac{3}{4}$ " x $\frac{3}{8}$ " x $\frac{1}{8}$ " - A-36 STR. STL.
 254 LBS/FTS (01-010)
 TOP SPOKE 01-07-026
 BOTTOM SPOKE 01-07-027
 HORIZ. SPOKE 01-07-028

01-07-026
 01-07-027

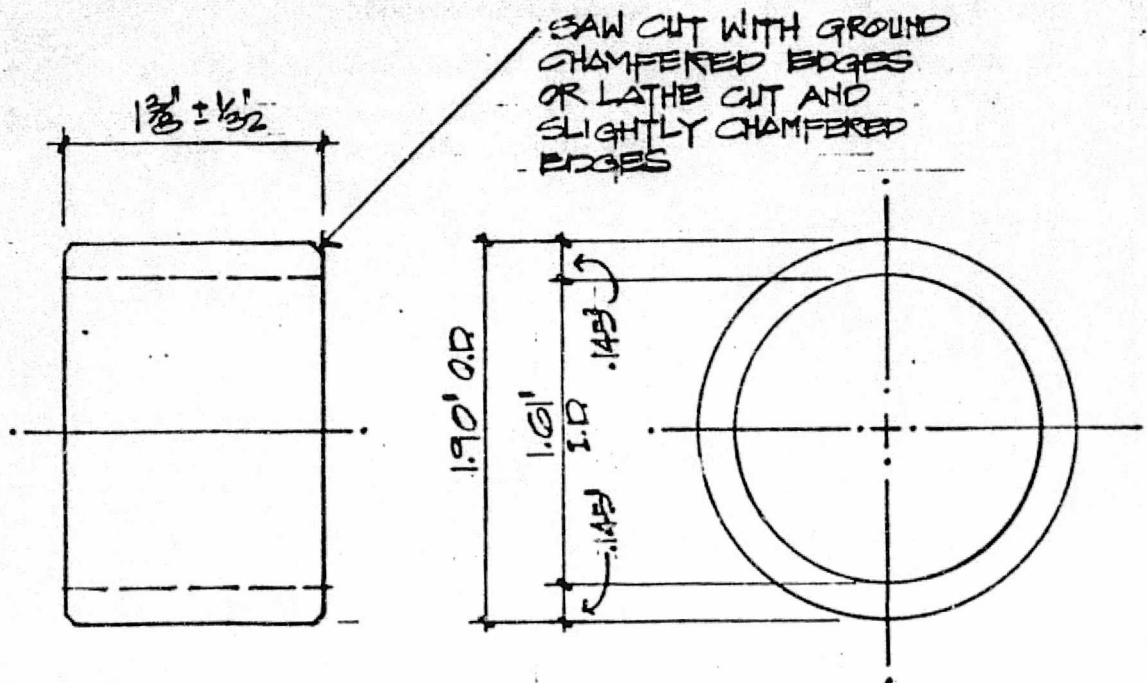
NORTHRUP

NORTHRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75441

PULLEY SPOKE

01-07-028	
DIRN	CHK
POS	FW
REV	

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PULLEY HUB

SCHEDULE 40, BLACK STEEL PIPE
2.72 LBS/L.F. (01-011)
1/2" NOM. SIZE 1.9" O.D., 1.61" I.D.

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

PULLEY HUB

01-07-029

DRN	RDS	CHK	FW
-----	-----	-----	----

01-01-70	REV
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NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-051

DATE 1/31/78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

LENS END CLOSURE

REV LENT. 1 OF 1

PART. NO. / REV / DESCRIPTION

9

01-03-051 Lens End Closure ASSEMBLY

1

01-21-004 Weather Stripping 3/4 x 3/16, Adhesive Back, Length as Req'd.

108

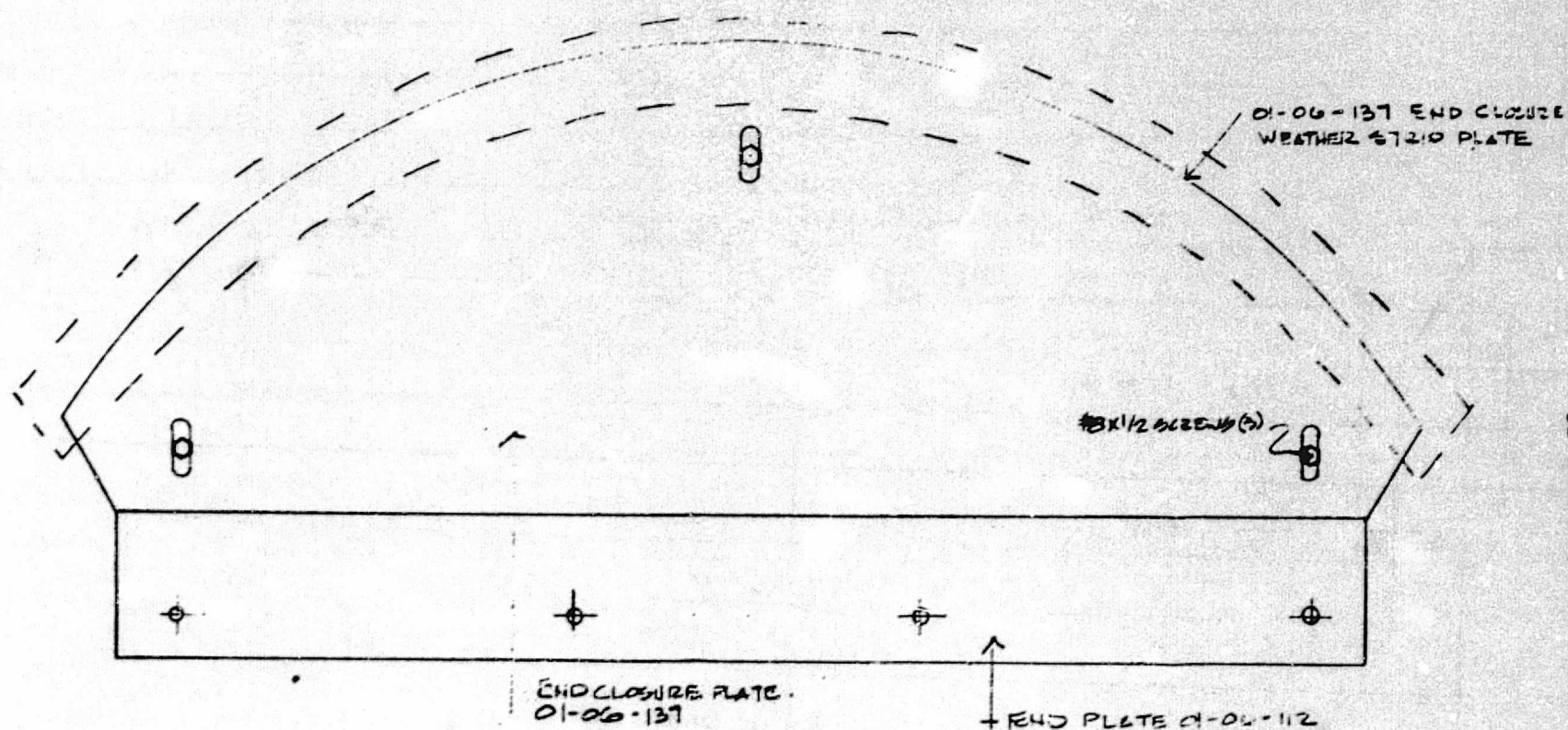
01-17-008 #8 x 1/2 Screws Zinc coated

8

01-06-112 END PLATE 16 GA. GALV. STEEL 5 1/8" x 12" (.51 FT²)

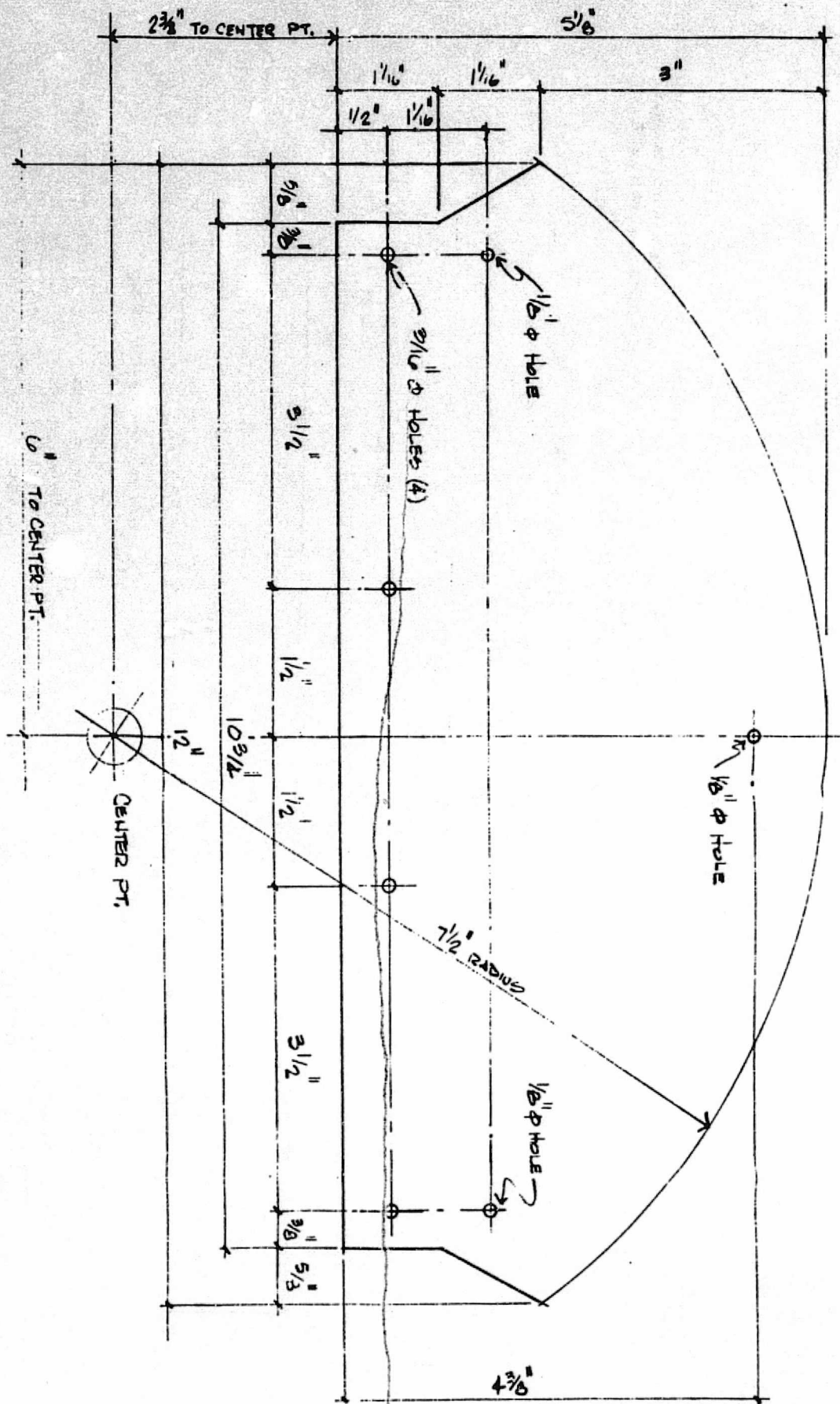
01-06-137 LENS END CLOSURE WEATHER STRIP PLATE 16 GA. GALV. STEEL 4 1/8" x 12 1/4" (.346 FT²)

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NOTE: ASSEMBLE BOTH PARTS SUCH THAT WEATHER STRIP IS BETWEEN THE TWO PARTS. FASTEN TOGETHER 2 SLOTTED HOLES PIVOT HOLE LOCATIONS LOOSELY WITH 3/8 X 1/2 SIZE W/ (3) (17-008). THEN ATTACH ASSEMBLY TO LENS AND MAKE ADJUSTMENT.

NORTHROP	LENS END CLOSURE ASSEMBLY	0-03-051	
		REV. 1	REV. 2
		3-57-53	2-57-53



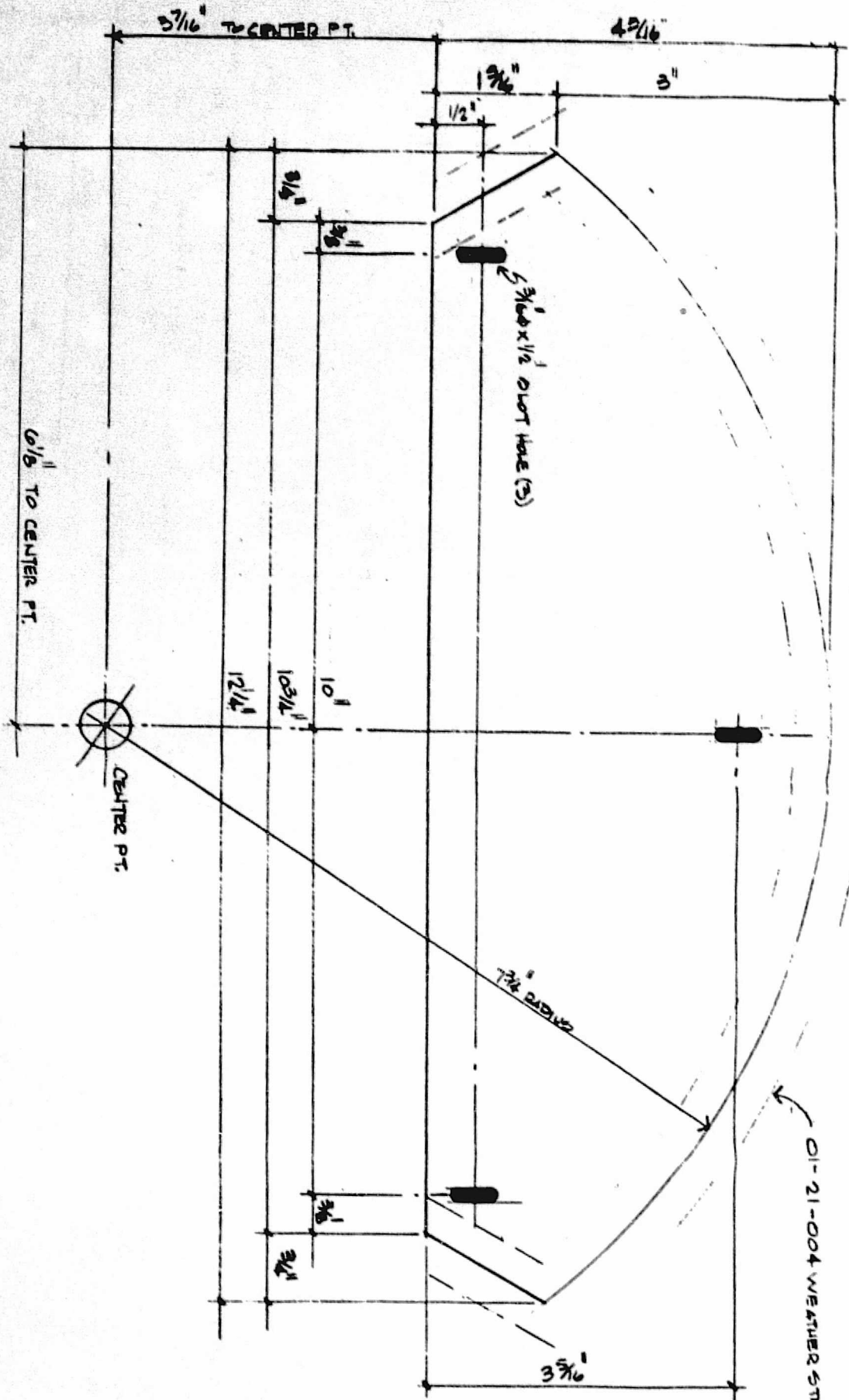
MATERIAL 20 GA. GALV (01-002)
 SHEAR SIZE: $5\frac{1}{8} \times 12$ (.427 FT²)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Wichita, Texas 75141

LENS END CLOSURE
 END PLATE

01-06-112	
DRN by	CHK
3-27-78	REV



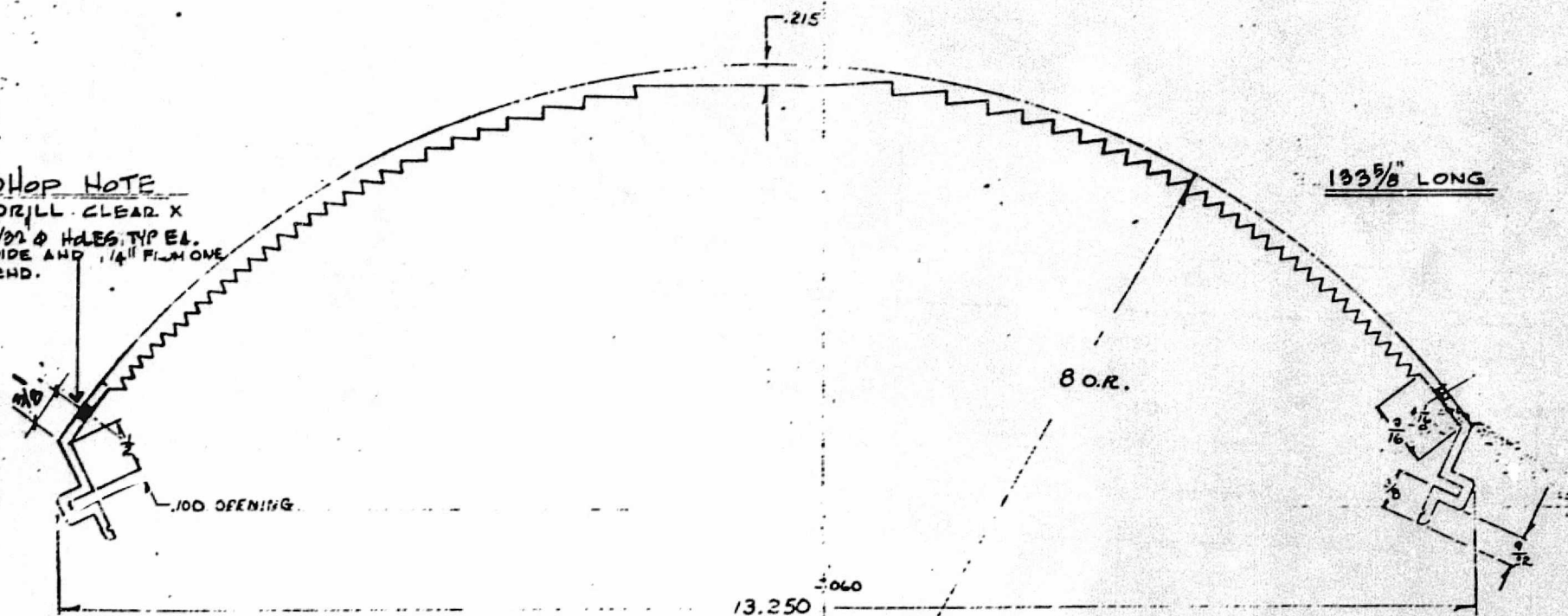
MATERIAL: 20 GA. GALV. (01-002)
 SHEET 6132 4 1/16 X 12 1/4" (.346 FT²)

NORTHROP NORTHROP, INCORPORATED 282 Nichols Drive, Moline, Texas 75141	LENS END CLOSURE WEATHER STRIP PLATE		01-06-137
	DRN	by	CHK
	3-27-76	REV	

APPROXIMATE FACETS

SHOP NOTE

DRILL CLEAR X
5/32" Ø HOLES TYPE A.
SIDE AND 1/4" FROM ONE
END.

COLLECTOR LENS

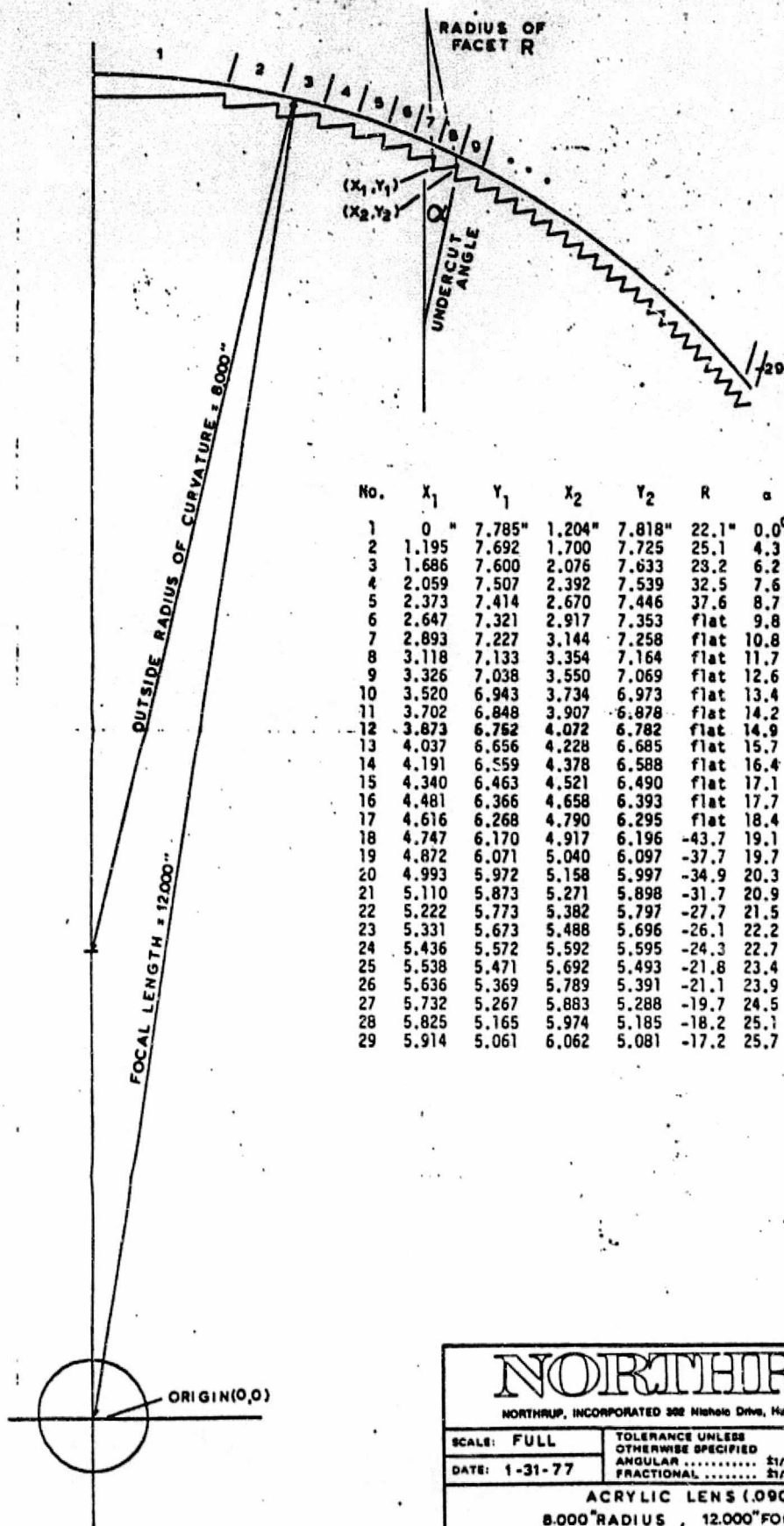
FULL SIZE
MAT'L: ACRYLIC
CLEAR COLOR
LENGTH: $120 \pm \frac{1}{16}$

SHEET 1 OF 2

Collector
Lens

2-15-71 ELS
2-9-78 REV A
01-20-001

NORTHROP



No.	X ₁	Y ₁	X ₂	Y ₂	R	α
1	0	7.785	1.204	7.818	22.1	0.0
2	1.195	7.692	1.700	7.725	25.1	4.3
3	1.686	7.600	2.076	7.633	28.2	6.2
4	2.059	7.507	2.392	7.539	32.5	7.6
5	2.373	7.414	2.670	7.446	37.6	8.7
6	2.647	7.321	2.917	7.353	flat	9.8
7	2.893	7.227	3.144	7.258	flat	10.8
8	3.118	7.133	3.354	7.164	flat	11.7
9	3.326	7.038	3.550	7.069	flat	12.6
10	3.520	6.943	3.734	6.973	flat	13.4
11	3.702	6.848	3.907	6.878	flat	14.2
12	3.873	6.752	4.072	6.782	flat	14.9
13	4.037	6.656	4.228	6.685	flat	15.7
14	4.191	6.559	4.378	6.588	flat	16.4
15	4.340	6.463	4.521	6.490	flat	17.1
16	4.481	6.366	4.658	6.393	flat	17.7
17	4.616	6.268	4.790	6.295	flat	18.4
18	4.747	6.170	4.917	6.196	-43.7	19.1
19	4.872	6.071	5.040	6.097	-37.7	19.7
20	4.993	5.972	5.158	5.997	-34.9	20.3
21	5.110	5.873	5.271	5.898	-31.7	20.9
22	5.222	5.773	5.382	5.797	-27.7	21.5
23	5.331	5.673	5.488	5.696	-26.1	22.2
24	5.436	5.572	5.592	5.595	-24.3	22.7
25	5.538	5.471	5.692	5.493	-21.8	23.4
26	5.636	5.369	5.789	5.391	-21.1	23.9
27	5.732	5.267	5.883	5.288	-19.7	24.5
28	5.825	5.165	5.974	5.185	-18.2	25.1
29	5.914	5.061	6.062	5.081	-17.2	25.7

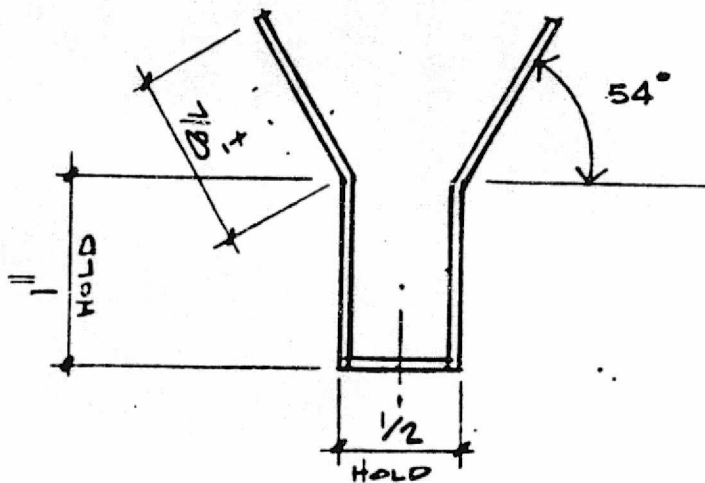
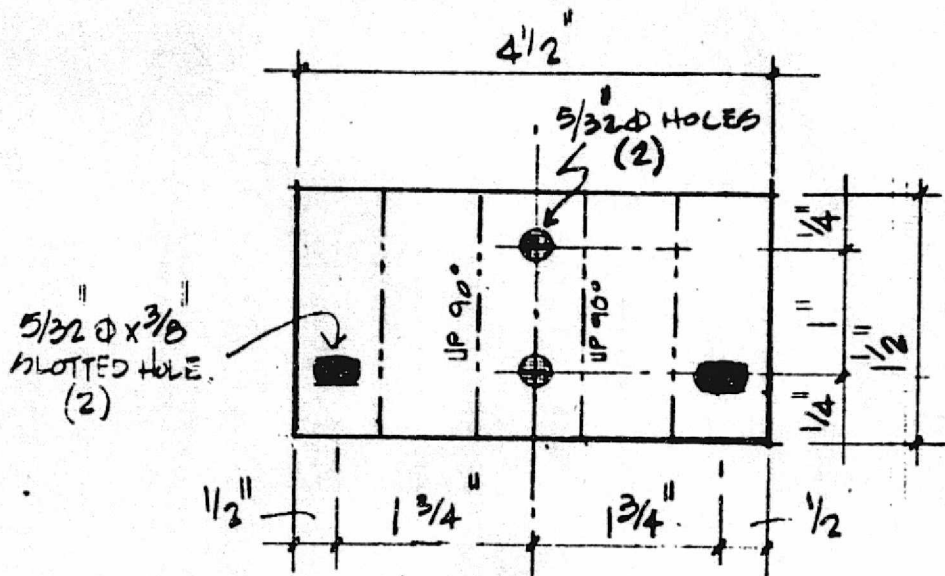
01-14-001

SHEET 2 OF 2

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SCALE: FULL	TOLERANCE UNLESS OTHERWISE SPECIFIED	DRAWN BY SW
DATE: 1-31-77	ANGULAR 1/32	REV A 2-9-78
	FRACTIONAL 1/32	
ACRYLIC LENS (.090" J20")		
8.000" RADIUS , 12.000" FOCAL LENGTH		
MATL ACRYLIC	SHEAR SIZE NA	DRAWING NUMBER 01-20-001



ORIGINAL PAGE IS
OF POOR QUALITY

MATERIALS

16 GA GALV. STL (01-001)
4 1/2" x 1 1/2" (.047 FT²)

REF. (A) REDRAWN

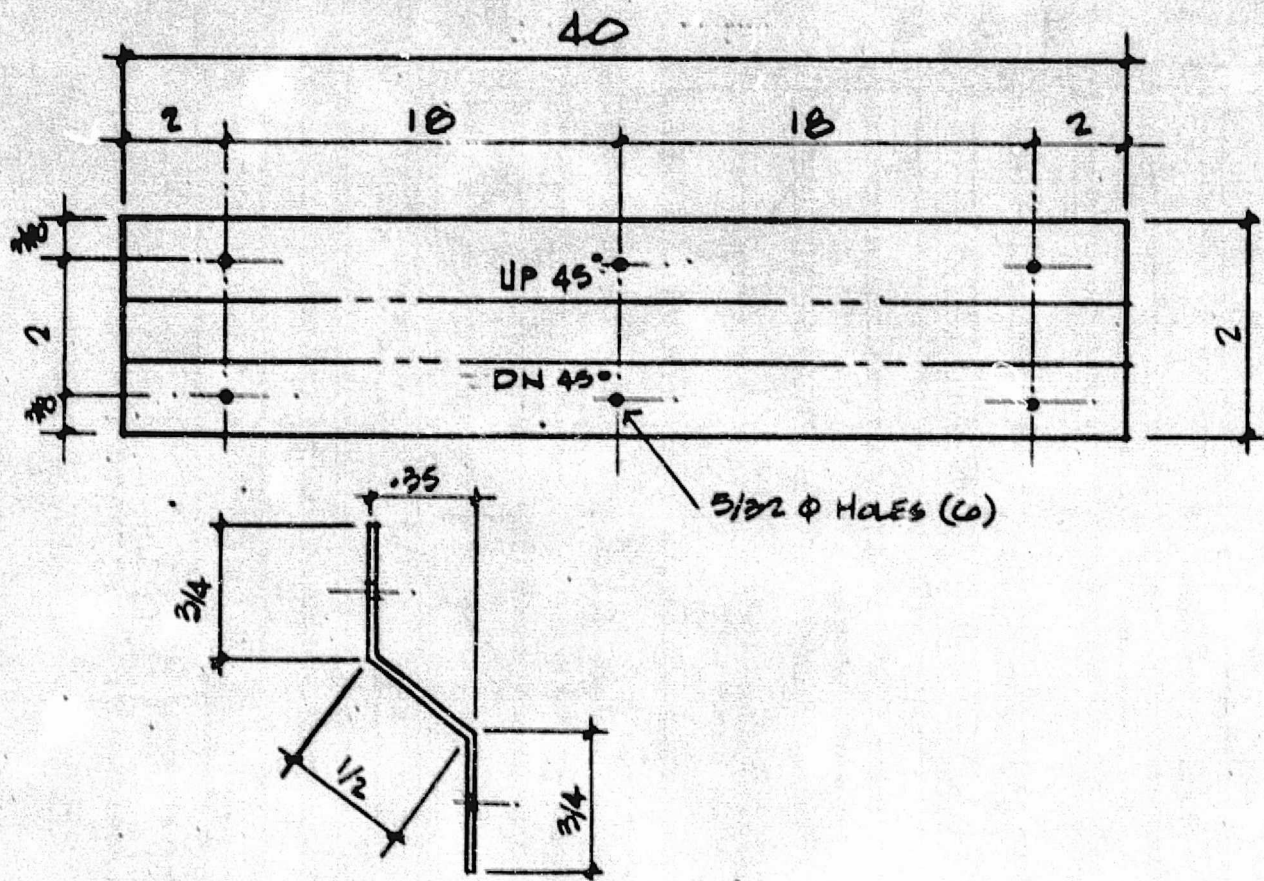
DIRTHORUP

IP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LENS RETAINER
TOP

01-06-030	
DRN by	CHK
2-2-70	REV A

1-28-75

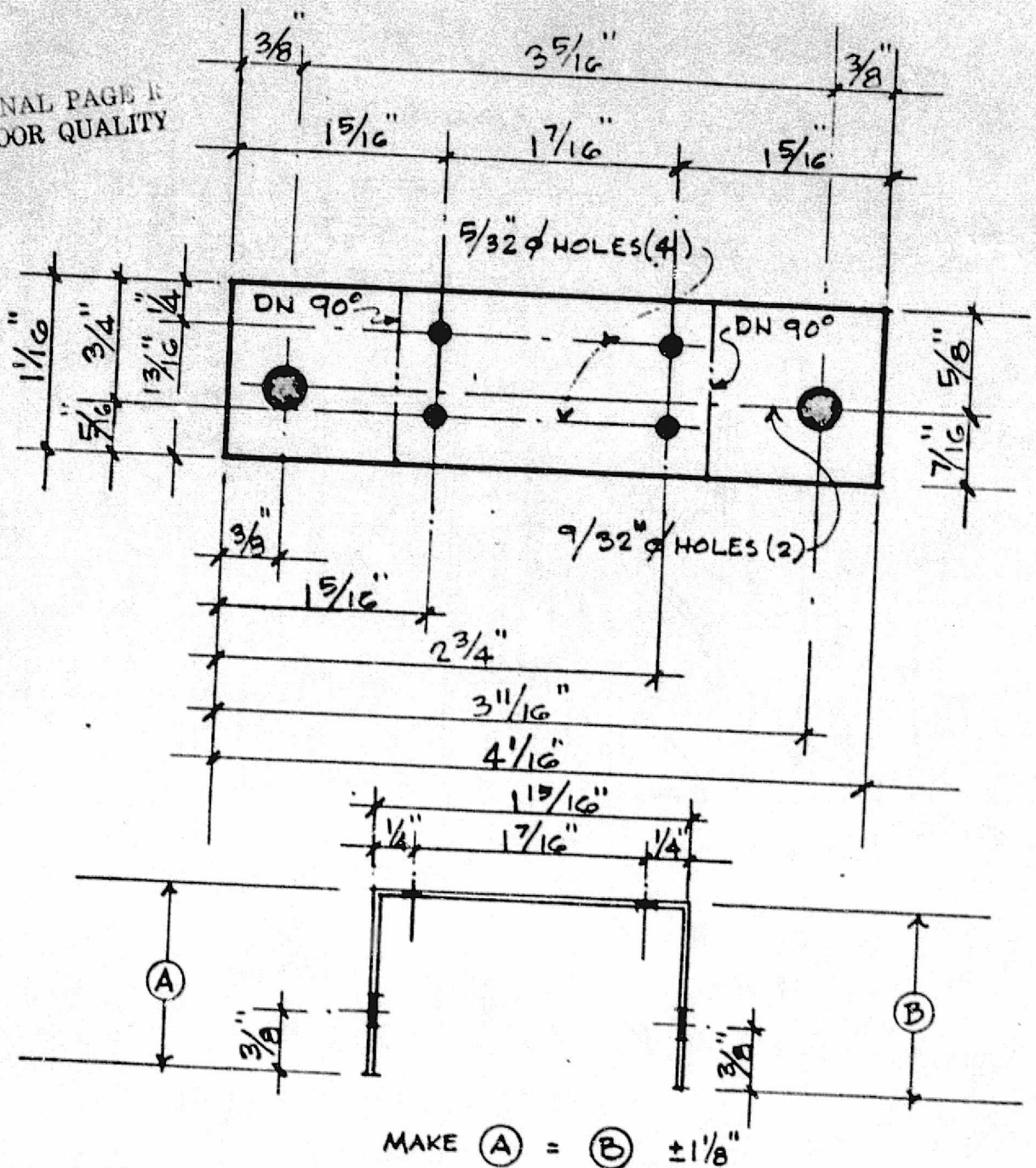


MATERIAL

20 GA. GALV STL. 01-01-001
2 X 40 (.55 ft²)

λ.

ORIGINAL PAGE 1
OF POOR QUALITY



MAKE (A) = (B) $\pm 1/8"$

MATERIAL: 20 GALV. STL (01-01-002) $1 1/16" \times 4 1/16"$ 0.030 FT²

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

END CONNECTOR
TRUSSED TORQUE
BAR

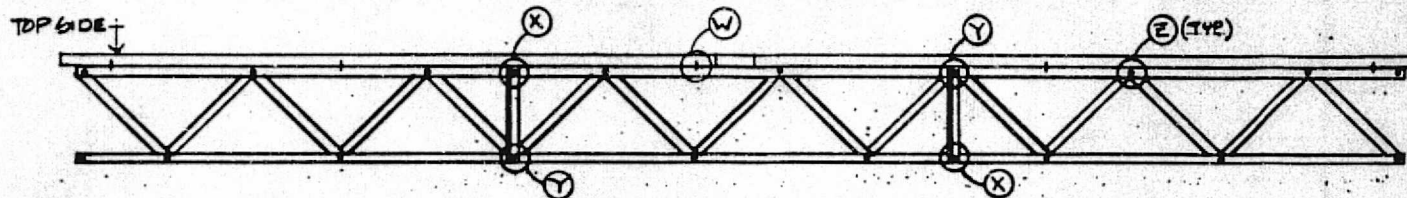
01-06-051

DRN FW CHK

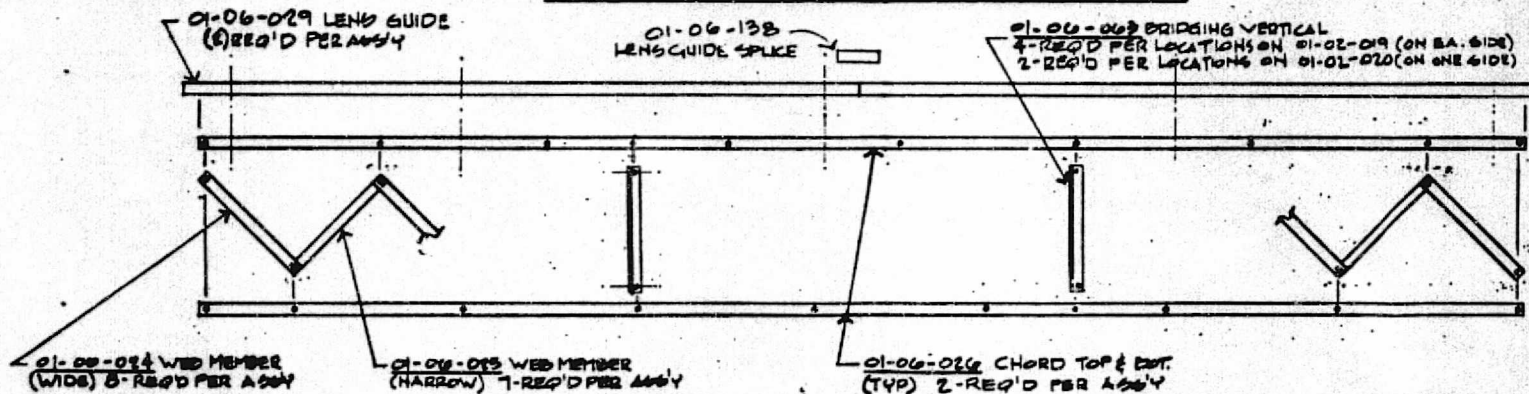
11-1-77 REV

COMMON PARTS -

- (X) 01-017-008, N° 8 X 1/2 SCREW, 6 REQ'D.
 (X) 01-017-057, BOLT - 1/4 X 2 1/4, 2 REQ'D
 01-017-028, NUT - 1/4, 2 REQ'D
 01-017-029, LOCK WASHER - 1/4, 2 REQ'D
 01-017-059, SPACER-BOLT - 1/4 X 1 1/2, 2 REQ'D.
 (Y) 01-017-057, BOLT - 1/4 X 2 1/4, 2 REQ'D.
 01-017-028, NUT - 1/4, 2 REQ'D.
 01-017-029, LOCK WASHER - 1/4, 2 REQ'D.
 01-017-058, SPACER-BOLT - 1/4 X 1 1/2, 2 REQ'D.
 (Z) 01-017-045, PIN - 1/4 X 2 1/4, 12 REQ'D.
 01-017-050, FASTENER LOCK-W/4, 12 REQ'D.



COLLECTOR TRUSS SUB-ASSEMBLY



NOTE:

REF: 01-03-049 COLLECTOR
 HOUSING ASSEMBLY

4-COLLECTOR TRUSS SUB-ASSY
 REQ'D PER COLLECTOR

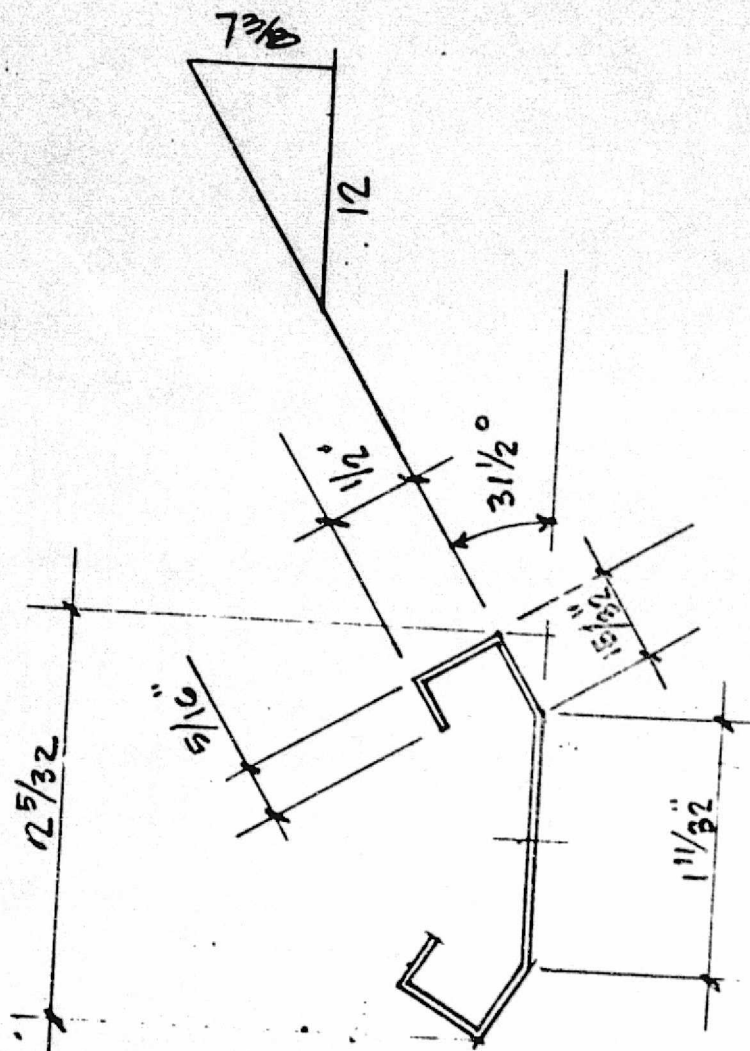
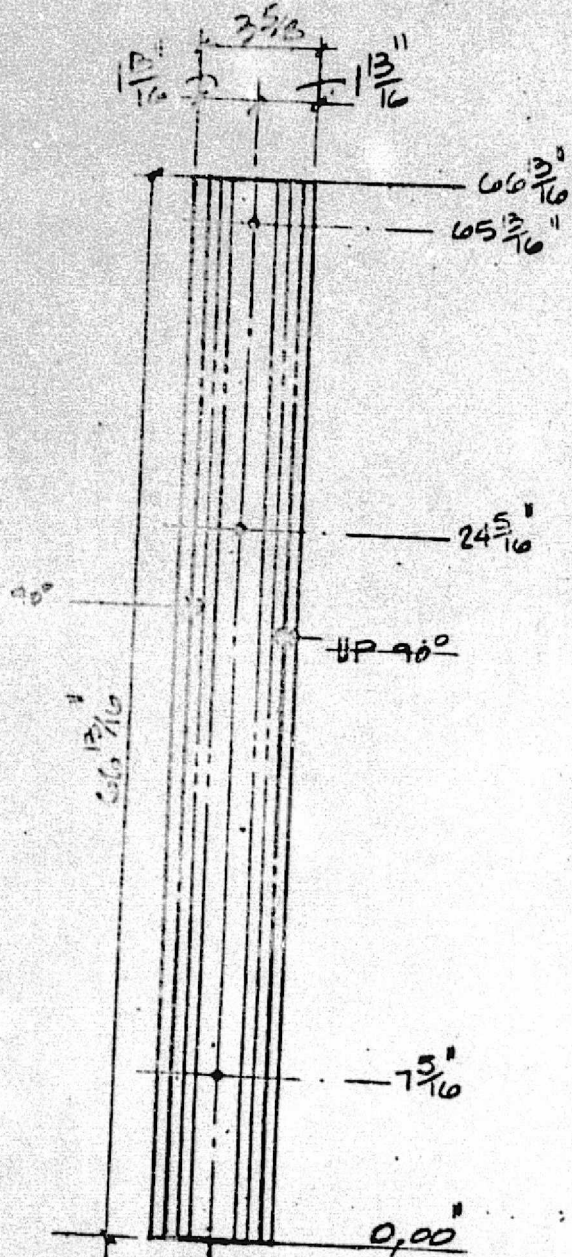
01-02-19 INTERIOR TRUSSES 2 REQ'D
 01-02-20 EXTERIOR TRUSSES 2 REQ'D
 4 TOTAL

NORTHTRUP

NORTHTRUP, INCORPORATED 202 Nichols Drive, Hutchins, Texas 75451

COLLECTOR
 TRUSS
 SUB-ASSEMBLY

01-02-020	
01-02-019	
DRN	CHK
125-73	REV.



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MTL 20 GA GALV. STL (01-01-002)
 $25\frac{1}{2} \times 66\frac{3}{16}$ " (1.682 FT²)

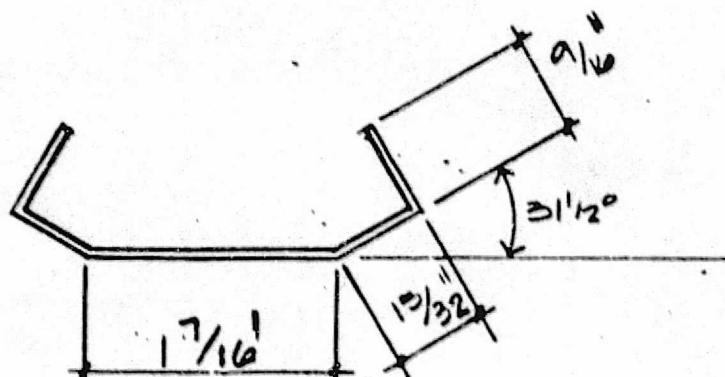
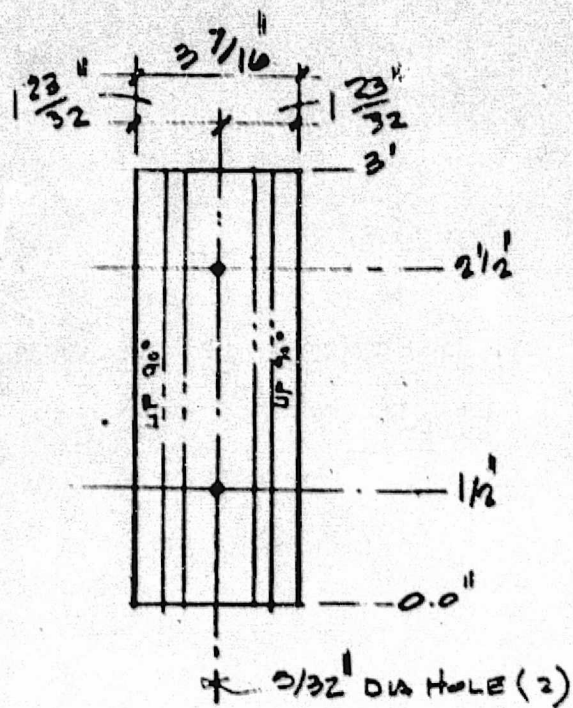
REV B, 3-29-78 GEN. 109
REV. A, 3-27-78 GEN. 67

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LENS GUIDE
COL'TR PANEL

01-06-029	
DRN	CHK
FW	REV
12-1-77	B



MATERIAL: 20GA GALV. STL
(01-002)
 $3\frac{7}{16} \times 3"$ (.072 FT²)

DIRTHORUP

INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LEND GUIDE SPLICE

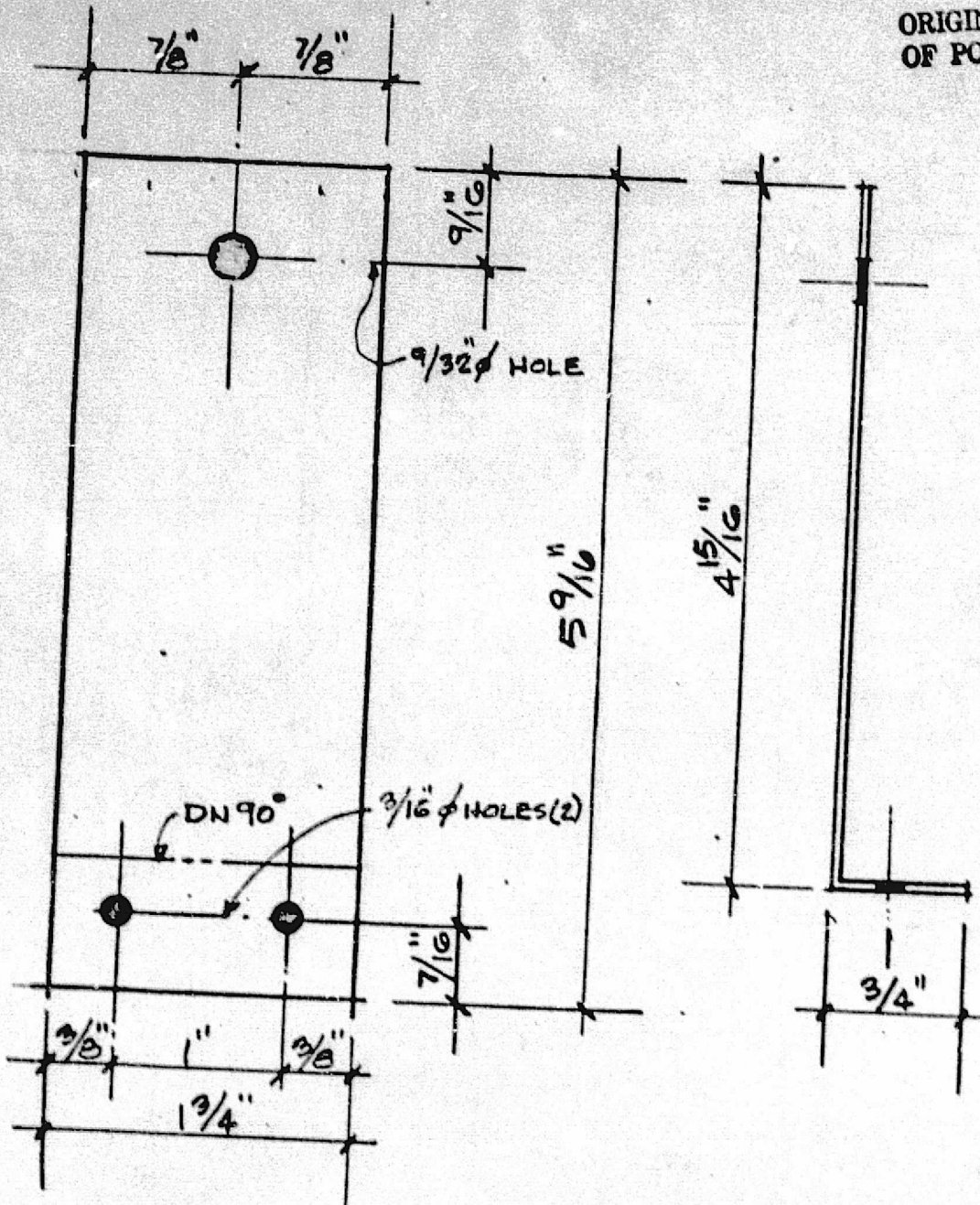
COLLECTOR PANEL

01-06-138

DRN *log* CHK

2 2 70 REV

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OF POOR QUALITY



MATERIAL: 16 GA GALV. STL (01-01-001) $1\frac{3}{4} \times 5\frac{9}{16}$ 0.068 FT²

NORTHROP

NORTHROP, INCORPORATED 202 Nichols Drive, Hutchins, Texas 75141

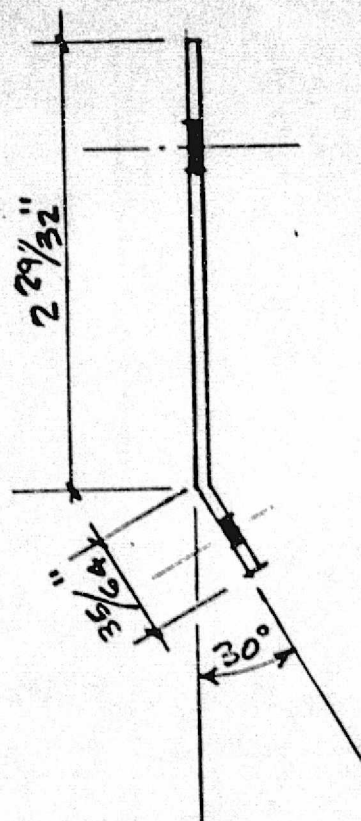
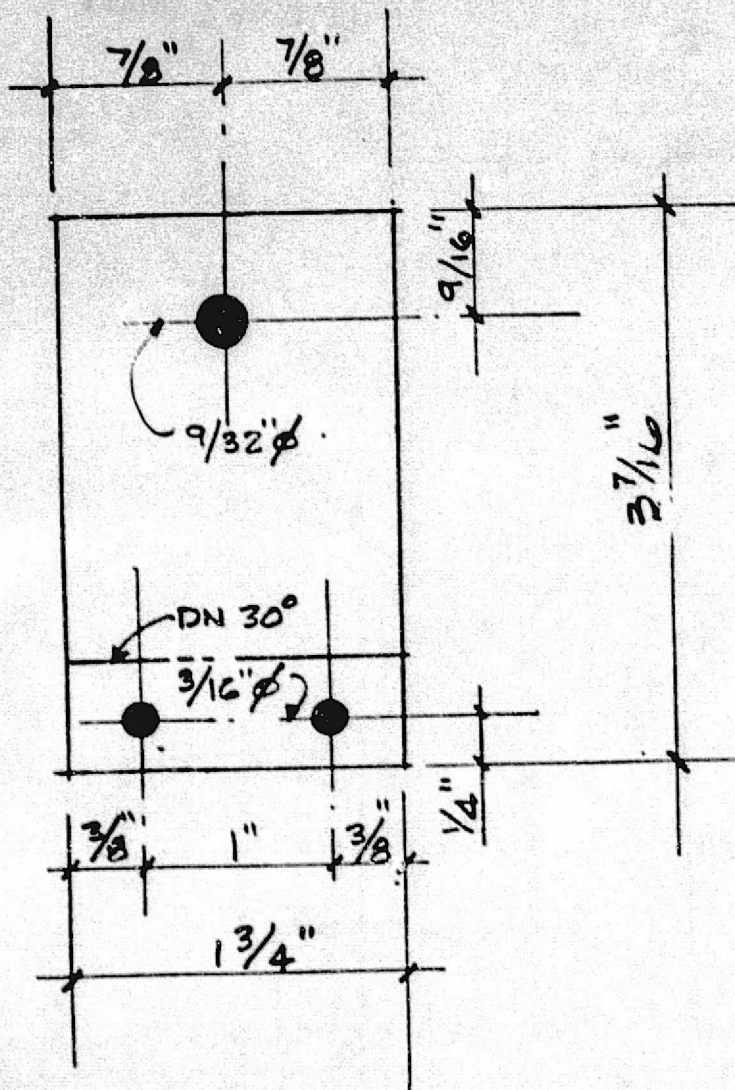
REV. A. 3-30-78 DIM 69

TRUSS CONNECTOR
TORQUE BAR - BOT.

01-06-050

DRN FW/ CHK

11-1-77 REV A



MATERIAL: 16 GA. GALV. STL. (01-01-001) $1\frac{3}{4}" \times 3\frac{7}{16}"$ 0.042 FT²

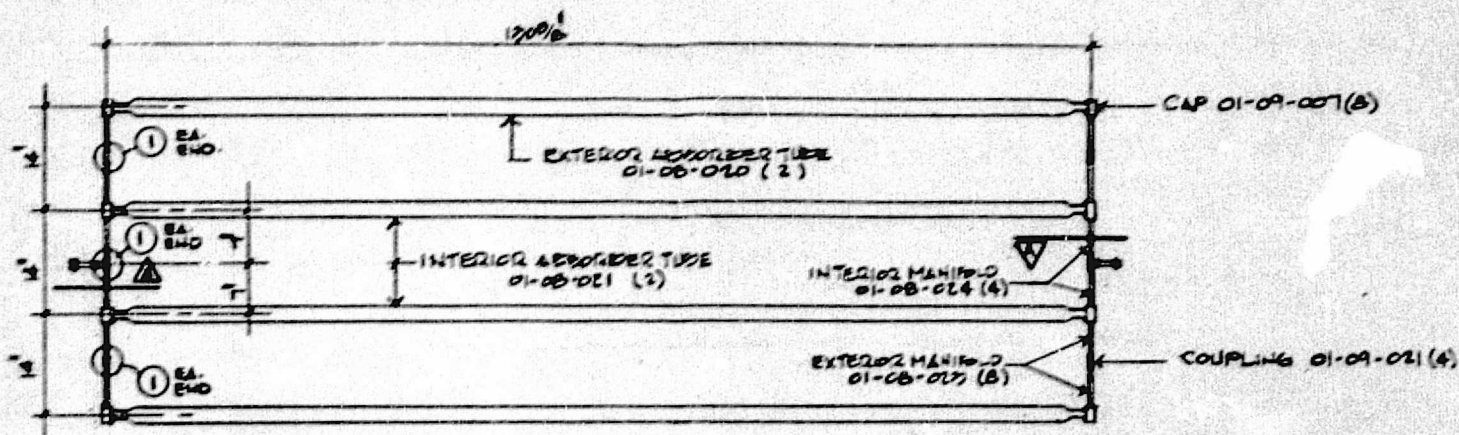
JOINTHURUP

THURUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

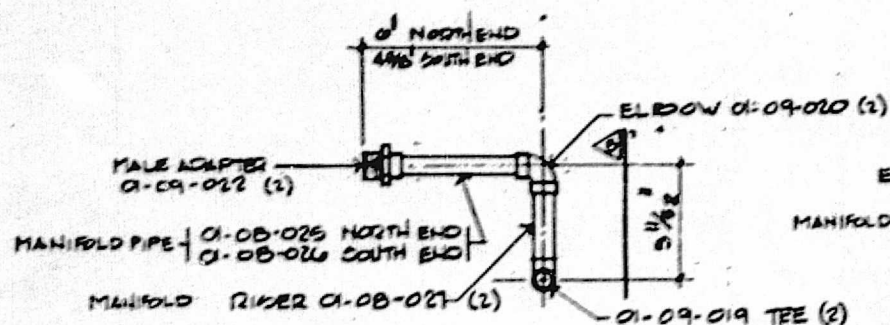
TRUSS CONNECTOR
TORQUE BAR-TOP

01-06-047
DIRN FW CHK
11-1-77 REV A

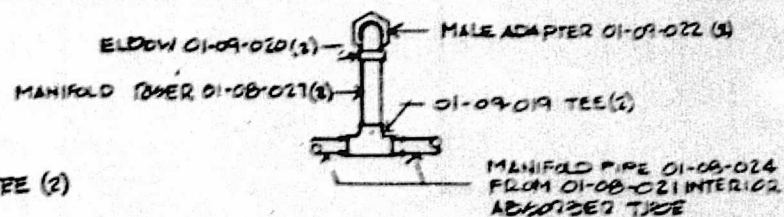
REV A 2-3-78 DHM.60



ABSORBER TUBE SUB-ASSEMBLY



SECT. A



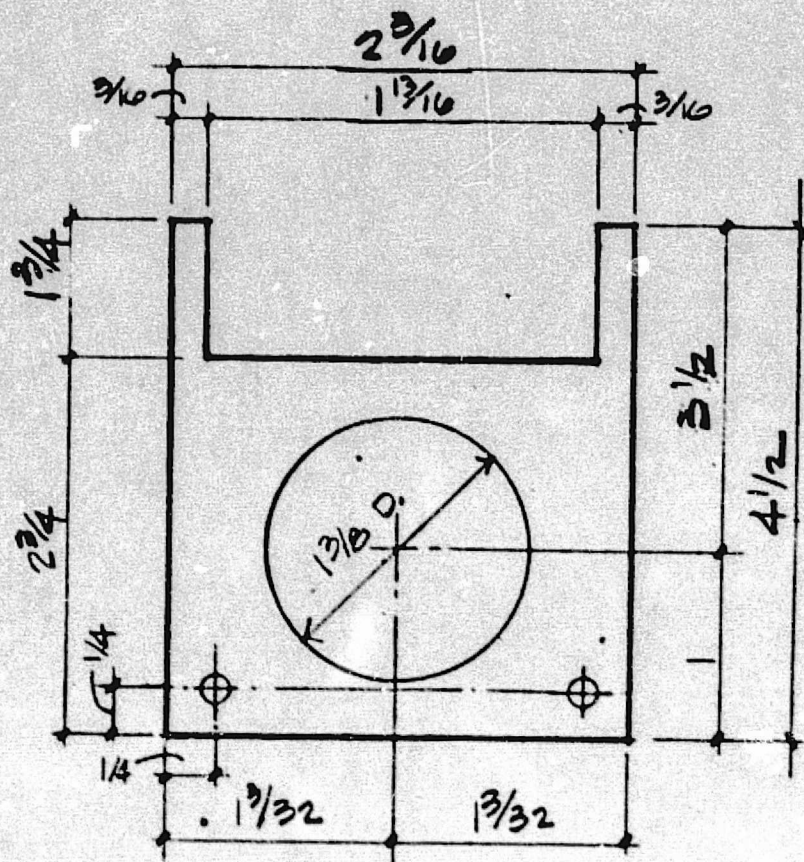
SECT. B

NOTE: DO NOT BRAZE UNTIL ABSORBER TUBE HAVE BEEN PLATED AND ARE READY FOR FINAL SHOP ASSEMBLY

NOTES:
HOLD ALL DIMENSIONS TO ± .01"

NORTHRIUP NORTHRIUP, INCORPORATED 888 W. 14th St., Houston, Texas 77041	ABSORBER TUBE SUB-ASSEMBLY	01-02-012
		DDH DB CHK
		1-10-76 REV.

ORIGINAL PAGE IS
OF POOR QUALITY



MATERIAL:

10 GA. GALV. STL. (01-01-001)
 $2 \frac{3}{16} \times 4 \frac{1}{2}$ (-068.FT.)

REV. B. 5-1-78 DIM. by.
 REV. A. 5-30-78 DIM. by.

JOINTHORUP

JOINTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

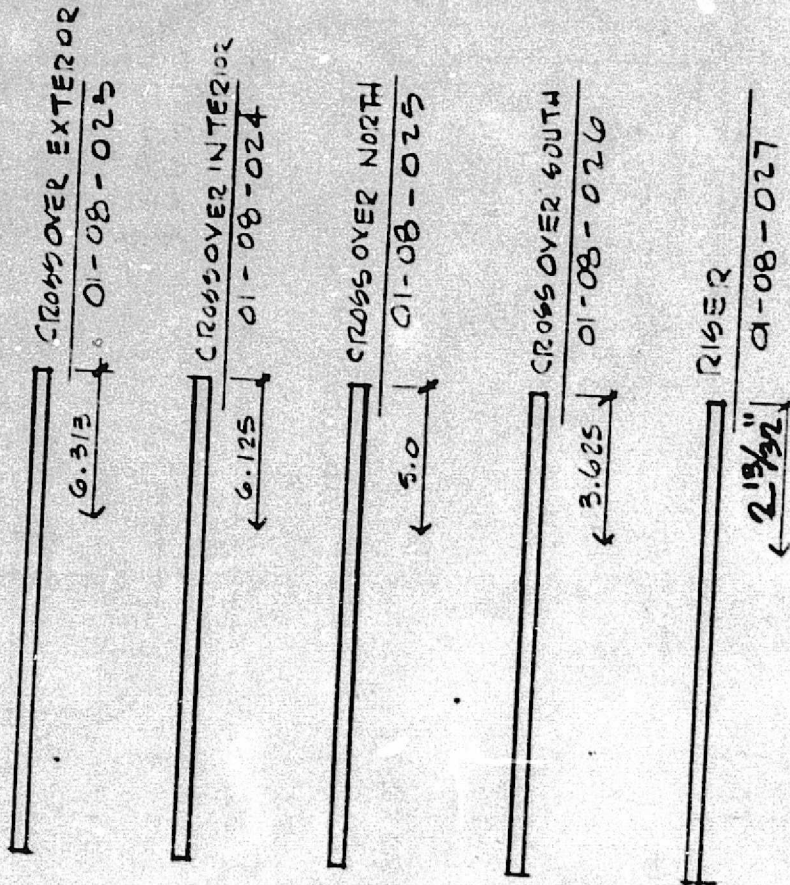
ABSORBER TUBE
 RETAINER

01-06-111

DRN BG CHK

1-27-78 REV B

ORIGINAL PAGE IS
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TYPE	QTY
CROSSOVER EXT.-	8
" INT.-	4
" NORTH-	1
" SOUTH-	1
RISE	2

NOTE: ALL TUBING 5/8" O.D., 1/2" NOM.
CU. TYPE "M". (01-01-121)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

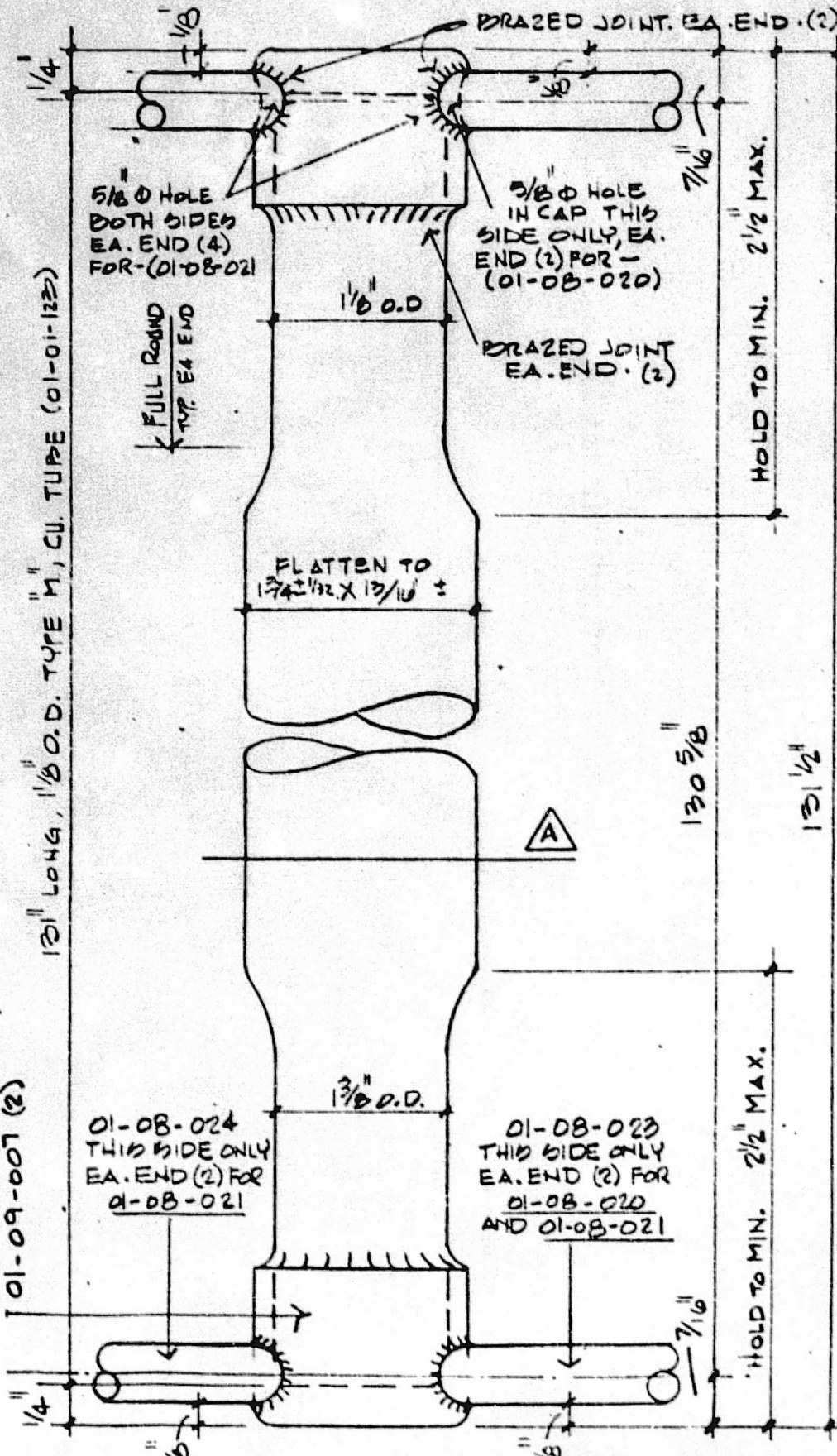
APPROX. TUBE(S)
CROSSOVER AND
RISE

REV. A 3-30-78 DIM. 69

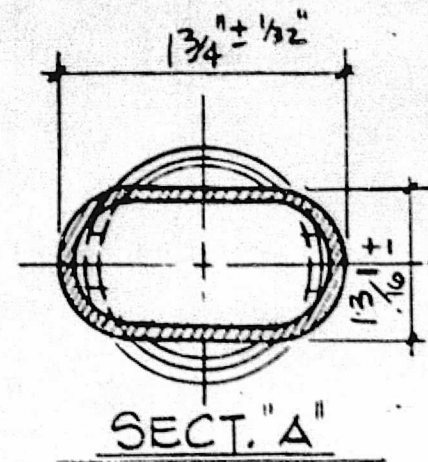
01-08-025 TO 01-08-027	
DRN	CHK
01-26-78	REV A

1/8 I.D. CU. CAP (TYPE M)
01-09-007 (2)

13" LONG, 1 1/8 O.D. TYPE M, CU. TUBE (01-01-123)



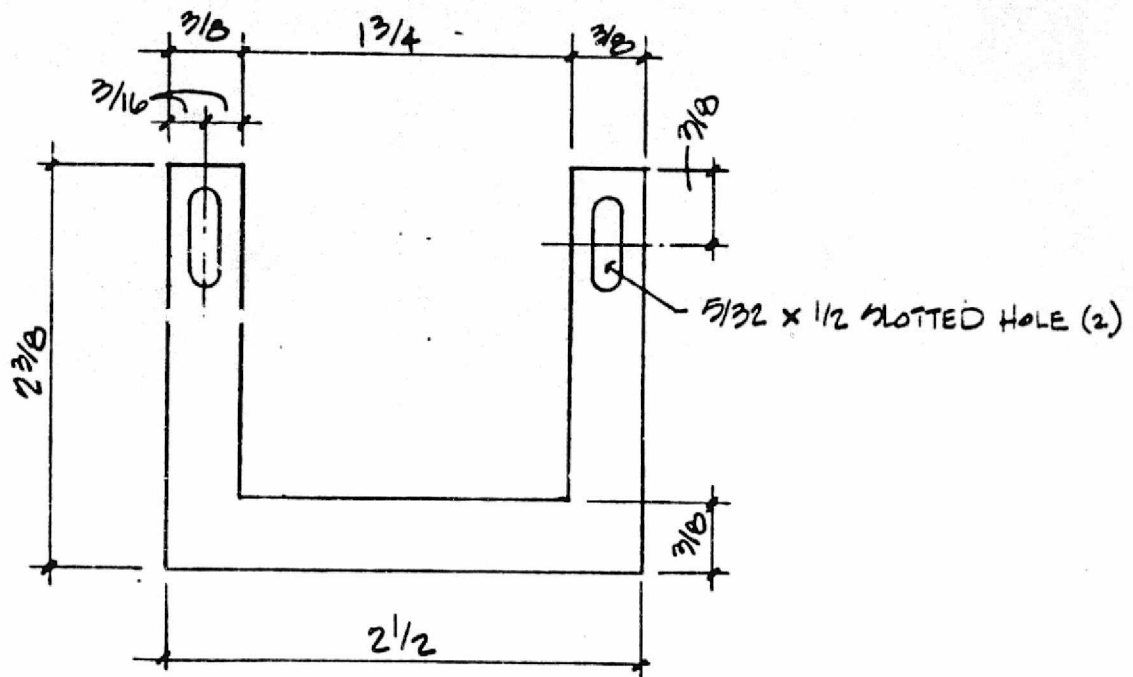
NOTE: 01-16-004
SELECTIVE COATING,
BLACK CHROME
(OLYMPIC) NASA SPEC
TO BE APPLIED
AFTER BRAZING
AND BEFORE FINAL
SHOP ASSEMBLY



- NOTE:
- FABRICATE PIPE & BRAZE CAPS.
 - FLATTEN PIPE AS INDICATED
 - DRILL HOLES PARALLEL TO FLAT SURFACE OF PIPE AS INDICATED.
 - MAKE (2) 01-08-020 AND (2) 01-08-021

01-08-020	
01-08-021	
DRN	CHK
1-25-78	REV A

ORIGINAL PAGE IS
OF POOR QUALITY



MATERIAL:

16 GA. GALV. (01-01-001)

$2\frac{3}{8} \times 2\frac{1}{2}$ (.041 ft²)

1 REQ'D

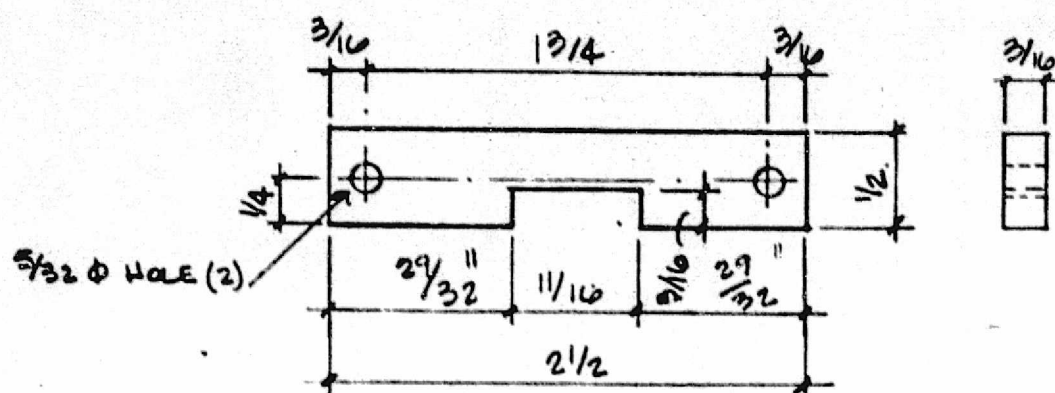
TO BE USED WITH 01-10-019

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

HIGH LIMIT SWITCH
U-FASTENER

01-06-108		
DRN	2G	CHK
1-31-78	REV	



MATERIAL:

1/2 x 2 1/2 x 1/4 BAKELITE BOARD

1 REQ'D

TO BE USE WITH 01-06-108

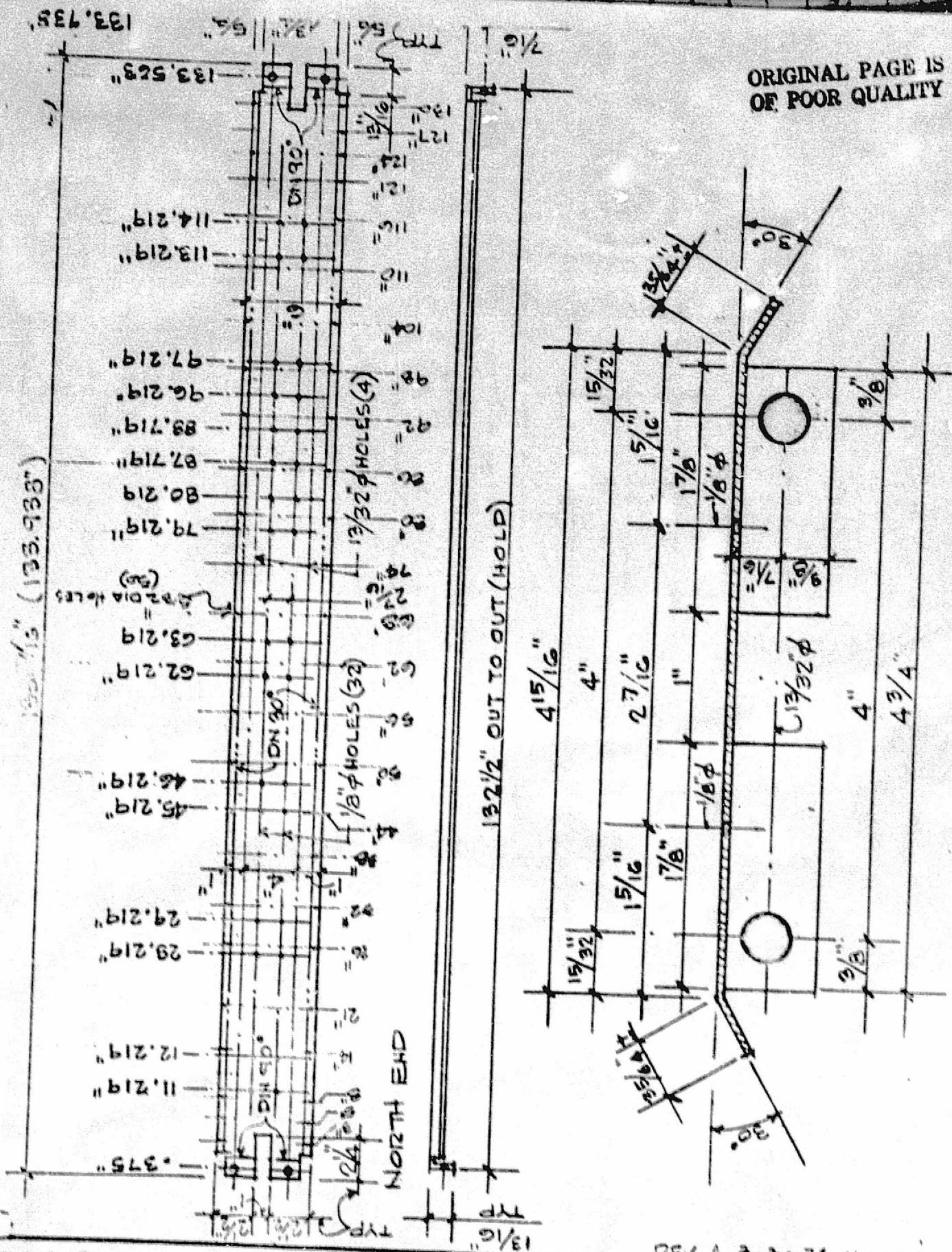
WORTH RUP

WORTH RUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

HIGH LIMIT SWITCH
BRIDGE FASTENER

01-10-019	
DRN BG	CHK
1-31-73	REV A

MATERIAL: 16 GA. GALV. STL. (01-01-001) 6" x 13 15/16" 5.531 FT²



NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

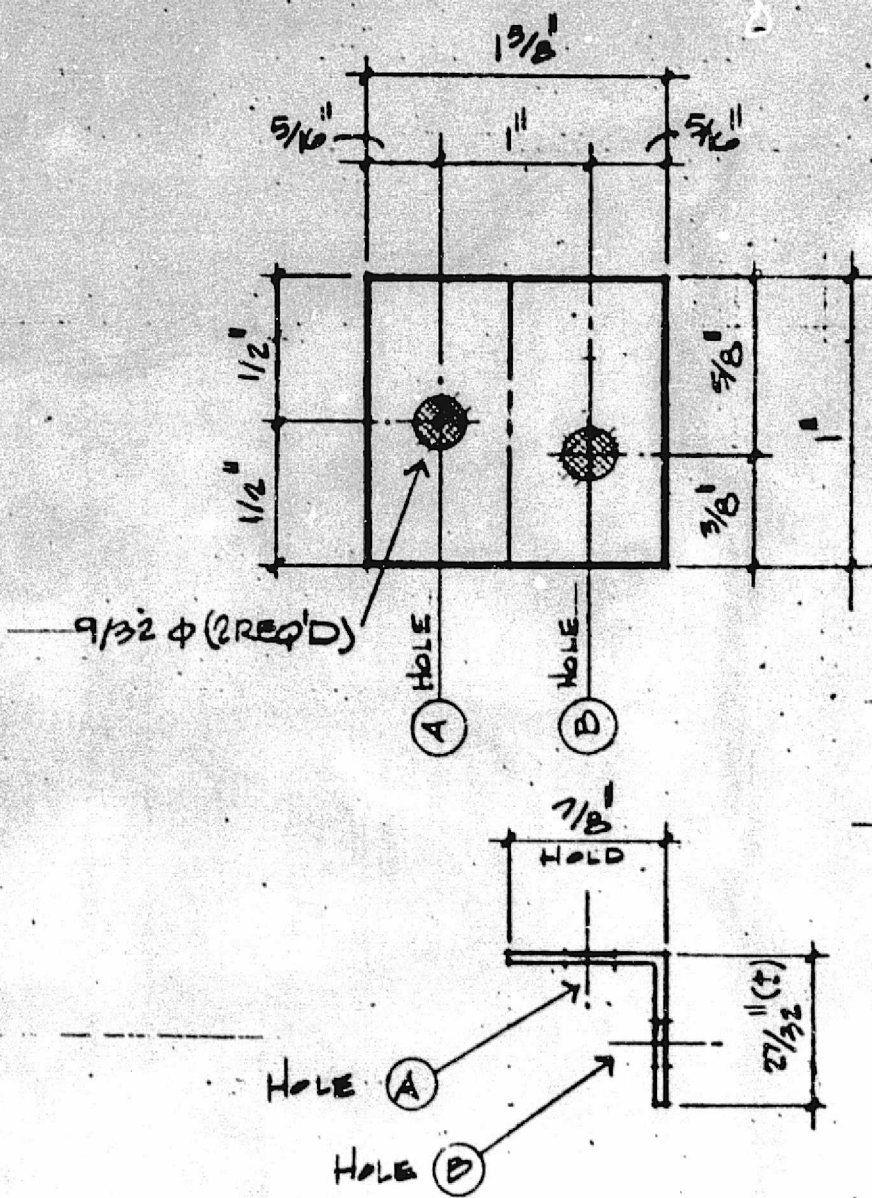
TORQUE BAR
BOTTOM

01-06-048

DRN	EW	CHK
-----	----	-----

11-1-77	REV A
---------	-------

1-11-78



01-06-064	R.H. AS SHOWN
01-06-079	L.H (OPPOSITE)

MATERIAL: 16 GA. ST.
 GALV. (01-01-001)
 SHEAR SIZE 1 5/8 x 1 (.01 ft²)
 ALL BENDS 90° , .016

JOINTHORUP

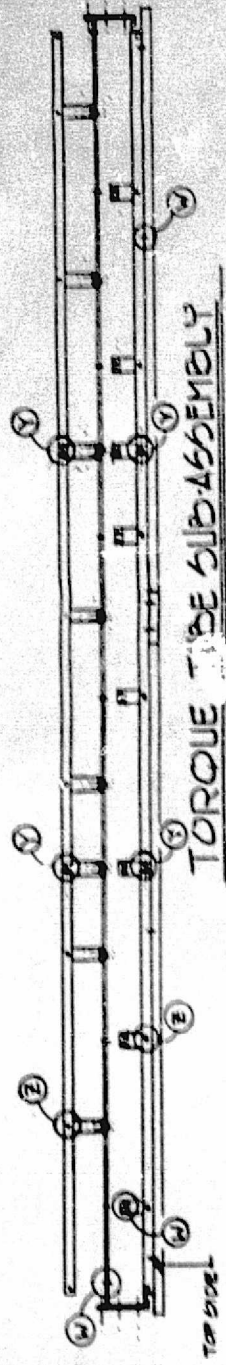
JOINTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

BRIDGING CONNECTOR
 TO TORQUE BAR
 COLLECTOR PANEL

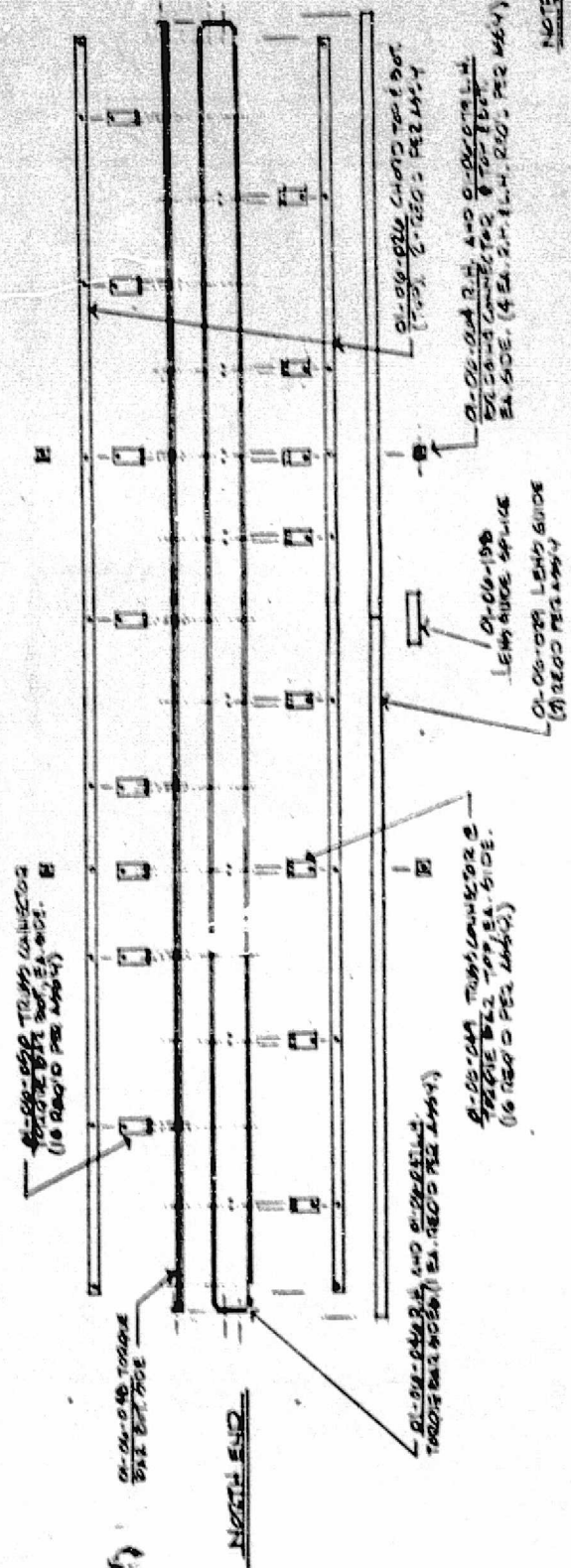
01-06-064
01-06-079
DRN
EG
11-13-78
REV. A

COMMON 9275

- (4) ON 11-00B, #0 2 1/2" x 11", 70 lbs -
 (5) ON 11-00B, BAY 1/4 2 1/4, 4 1/2" -
 ON 11-01A, BAY 1/4, 4 1/2", 4 1/2" -
 ON 11-01A, BAY 1/4, 4 1/2", 4 1/2" -
 ON 11-01B, BAY 1/4, 4 1/2", 4 1/2" -
 (6) ON 11-01B, PIN 1/4 2 1/4, 4 1/2" -
 ON 11-01B, BAY 1/4, 4 1/2", 4 1/2" -



① TORQUE - 5 LB-ASSEMBLY

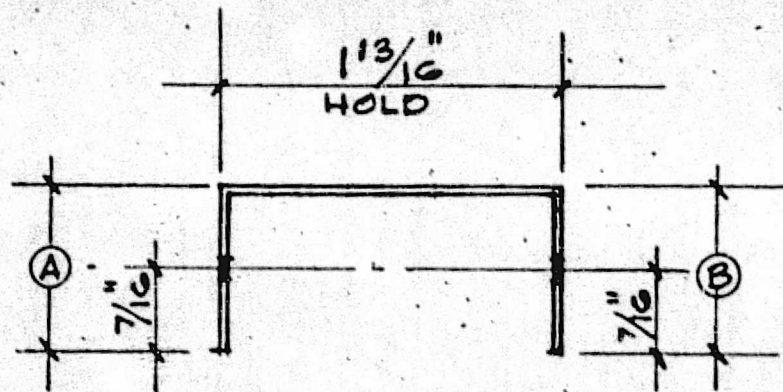
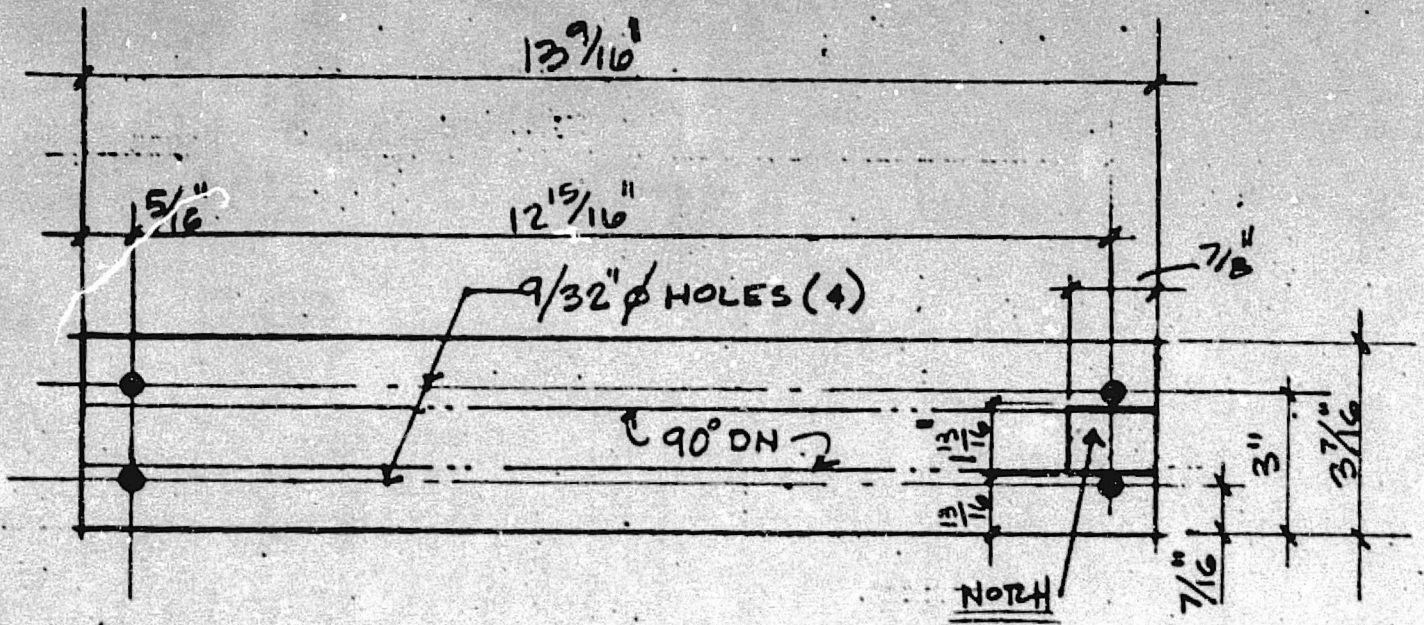


NOTE: REF. 01-03-009 COLLECTOR.

Q86. A 3-3572 524 C.C. engine is shown.

TOQUE TIME	0-02-009
CUB. AGVEMENT	004
	1-25-75 'A

NOIRLTHORUP



NOTE: MAKE (A) = (B) 7/8" $\pm$

20 GA. GALV. STL. (01-01-002)

3⁷/₁₆" x 13⁹/₁₆" .32 FT²

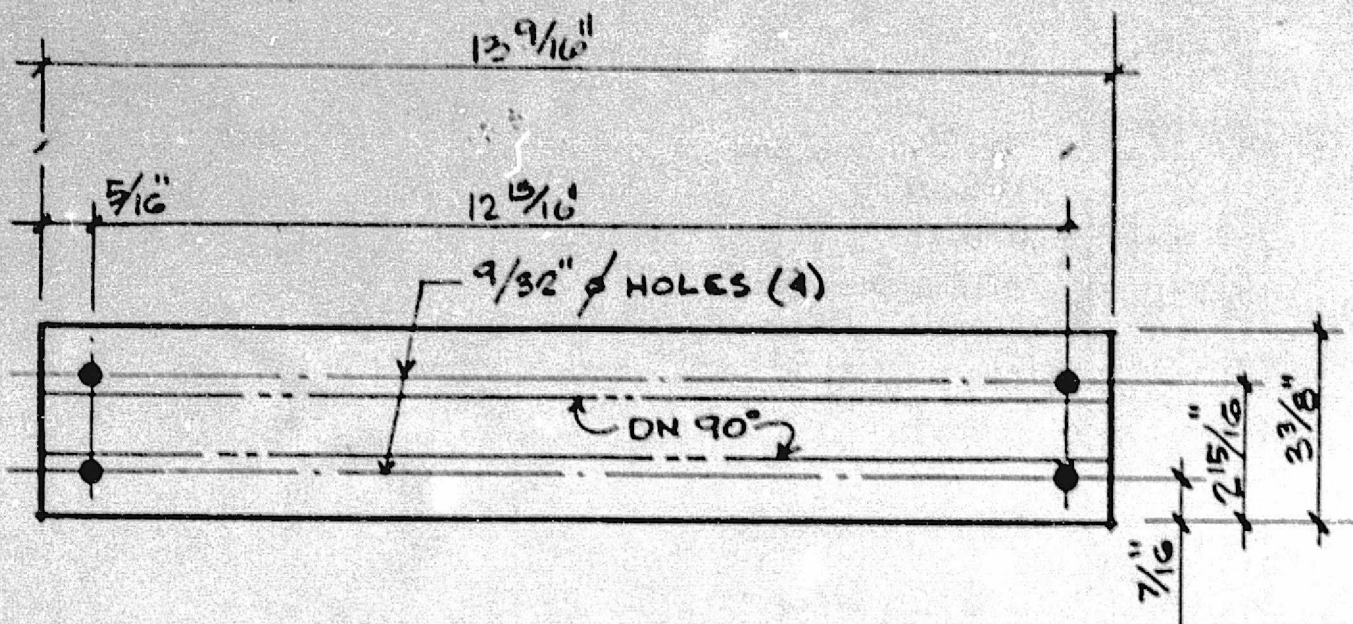
REV A. 3-20-78 (DIM & NOTE 2) log

JOINTHORUP

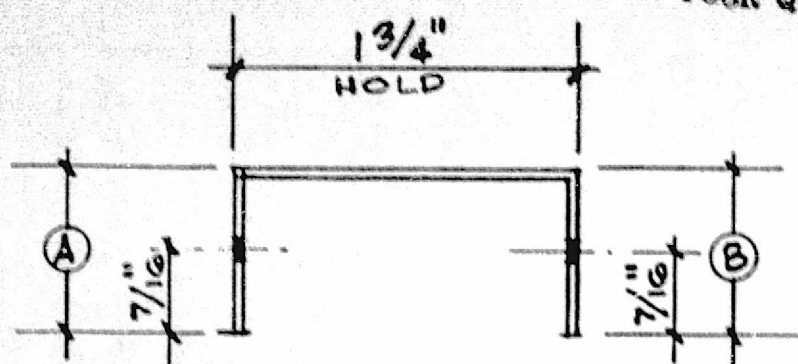
JOINTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

WEB MEMBER-WIDE
COLLECTOR TRUSS

01-06-024	
DRAWN FW	CHECKED
10-14-77	REV A



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OF POOR QUALITY



NOTE: MAKE (A) = (B) $\frac{7}{8}" \pm$

MTL: 20 GA. GALV STL (01-01-002) .32. FT²
 $3\frac{3}{8}" \times 12\frac{9}{16}"$

NORTHROP

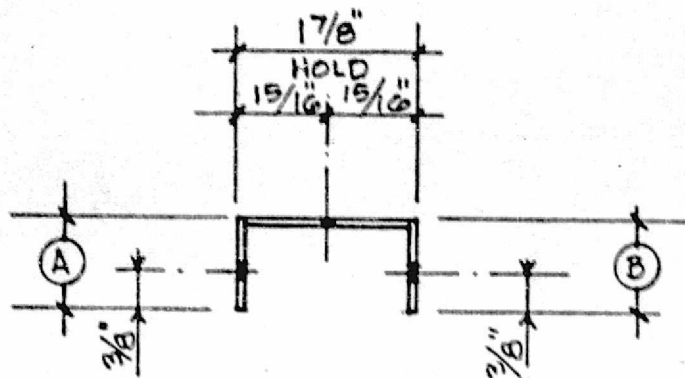
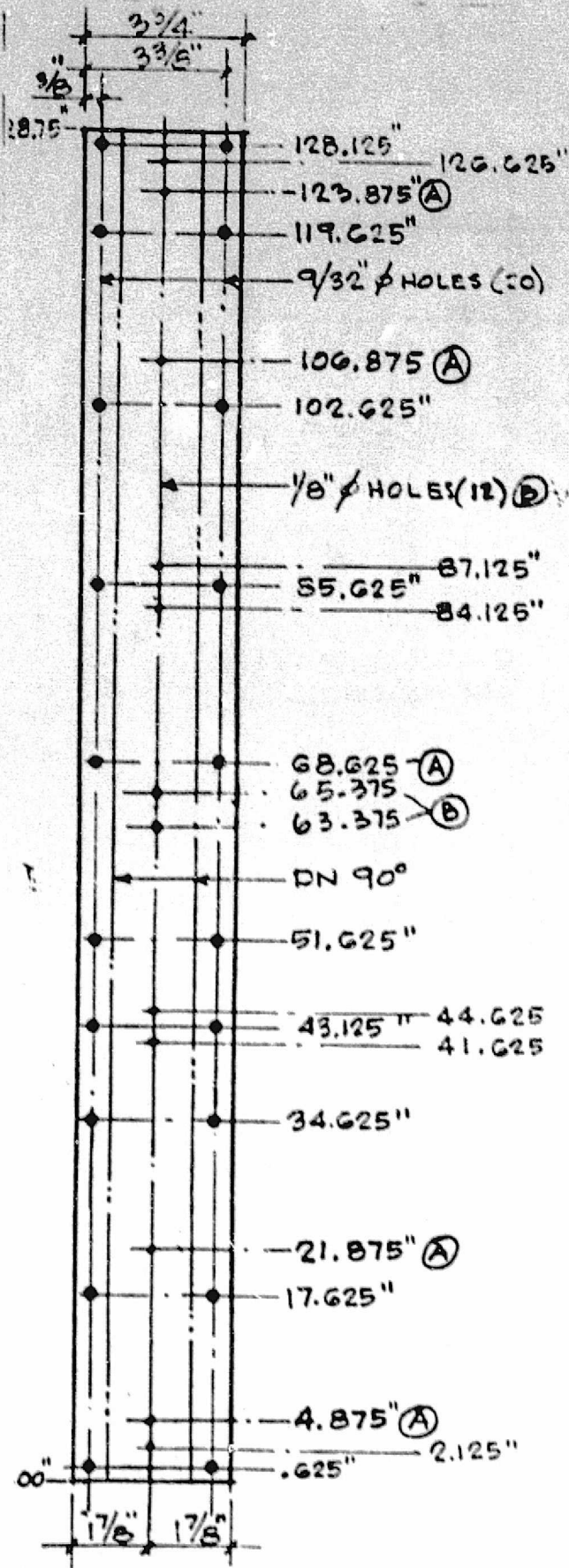
NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

WEB MEMBER-NARROW
COLL'TR TRUSS

01-06-025

DRN FW CHR

10-27-77 REV



MAKE (A) = (B) 1" $\pm$

MTL. 20 GA GALV. STL. (01-01-002)
 3 3/4" x 128 3/4" 3.353 FT²

REV. B 3-30-78 by

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

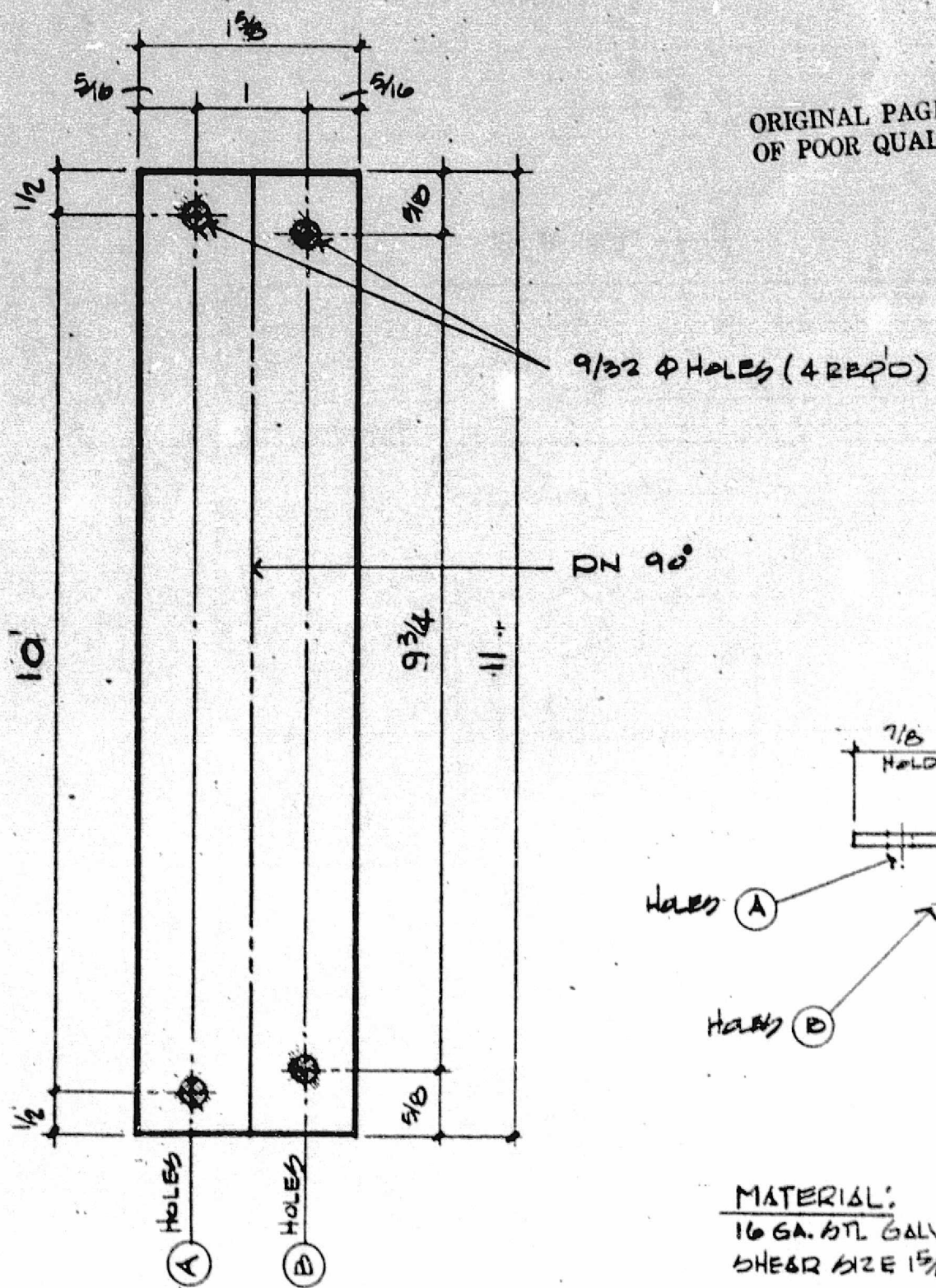
CHORD-TOP & BOTTOM
COLLECTOR TRUSS

01-06-026

DRN FW CHK

10-2877 REV (A)
12-1-77

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MATERIAL:
16 GA. STL GALV. (d-01-001)
SHEAR SIZE 15/8 x 11 1/4 (D. 126)

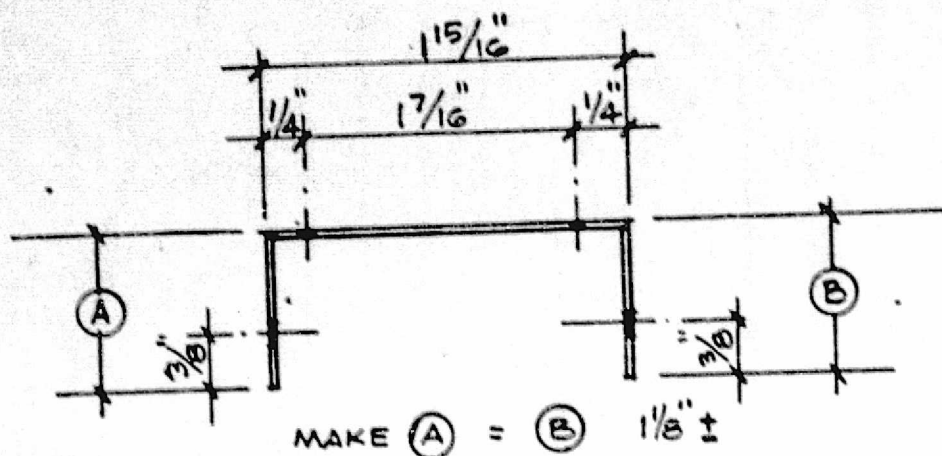
REV. A. 3-30-78 DIM. 64.

NORTHROP

NORTHROP, INCORPORATED 303 Nichols Drive, Hutchins, Texas 75141

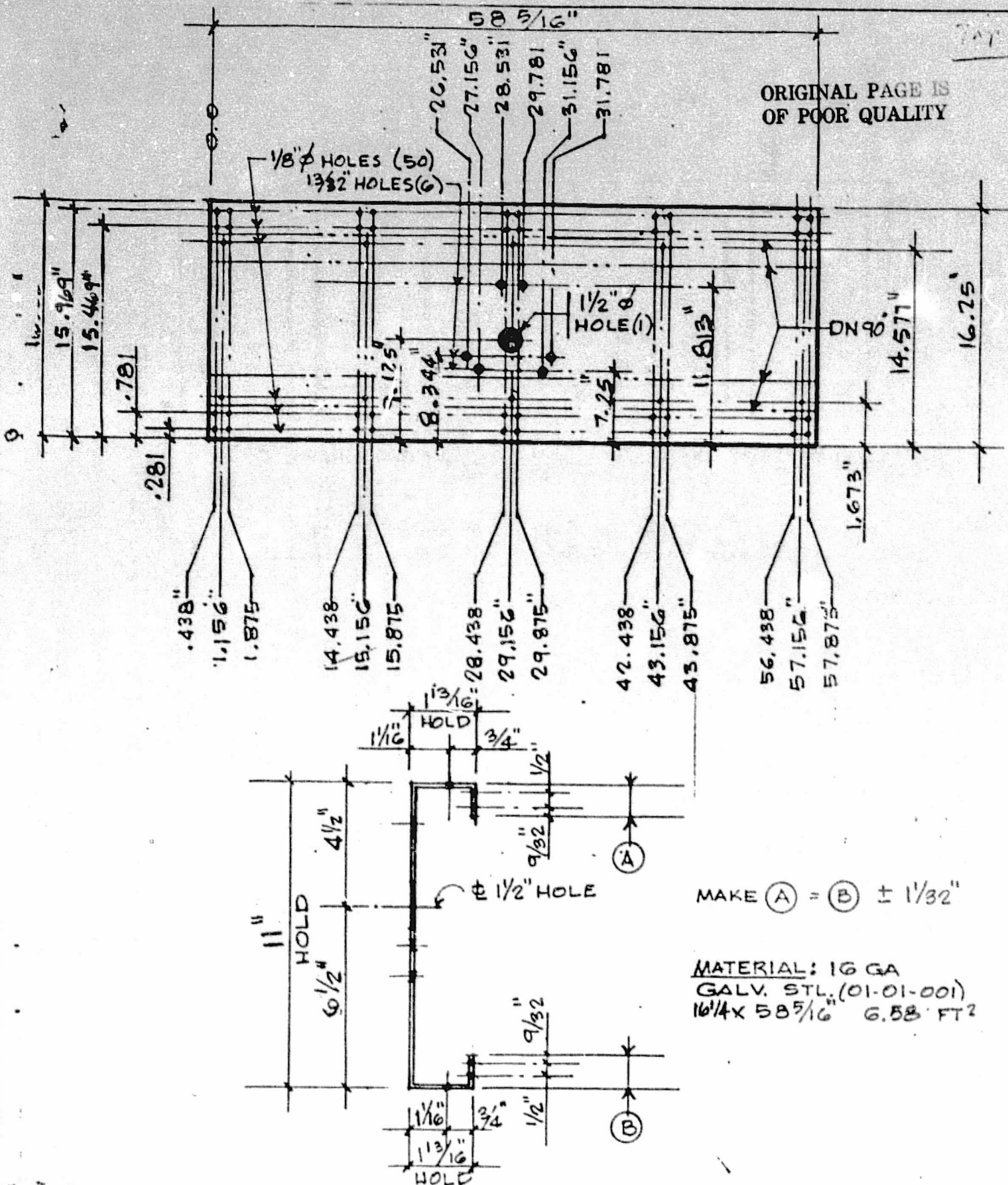
BRIDGING-VERTICAL
COLLECTOR
PANEL

01-00-063		
DRN	RCG	CHK
1-13-78	REV	A



124

ORIGINAL PAGE IS
OF POOR QUALITY



MAKE (A) = (B) $\pm 1/32$ "

MATERIAL: 16 GA
GALV. STL. (01-01-001)
16 1/4 X 58 5/16" 6.58' FT²

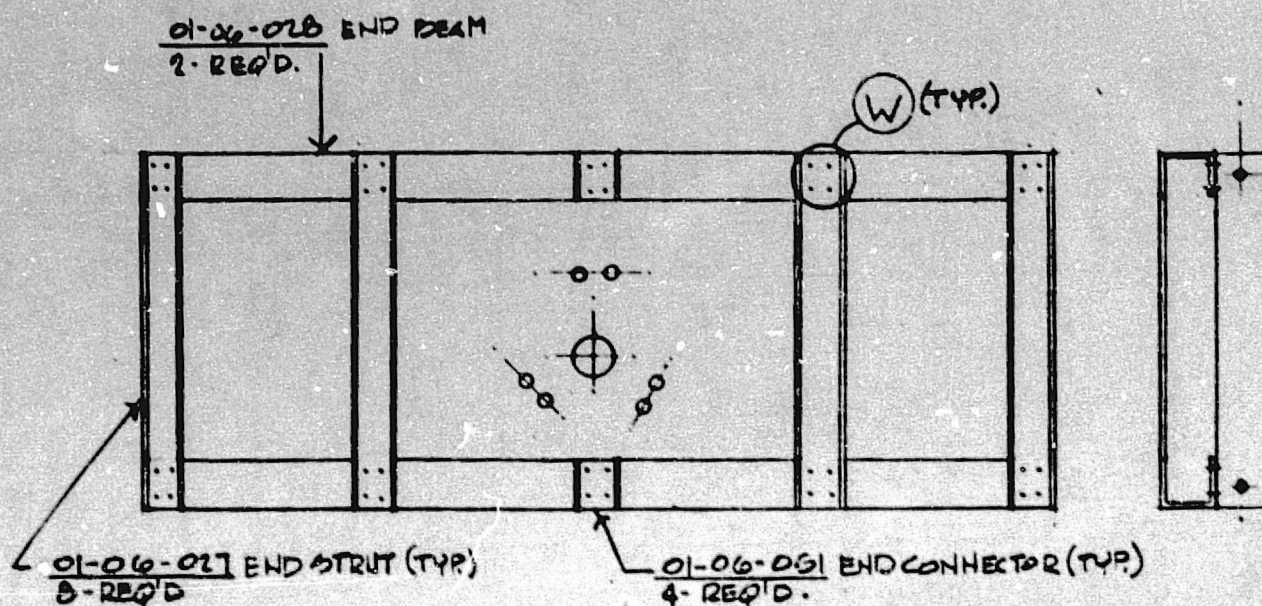
REV. A. GEN. 3-29-78

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

**END BEAM-
COLL'TR. TRUSS**

01-06-028		
DRN	FW	CHK
10/25/77	REV	A



END BEAM SUB-ASSEMBLY

COMMON PARTS-

(W) 01-017-008, No 8 SCREW, 80 REQ'D.

NOTE: REF: 01-03-049 (COLLECTOR HOUSING ASSEMBLY LOCATION)

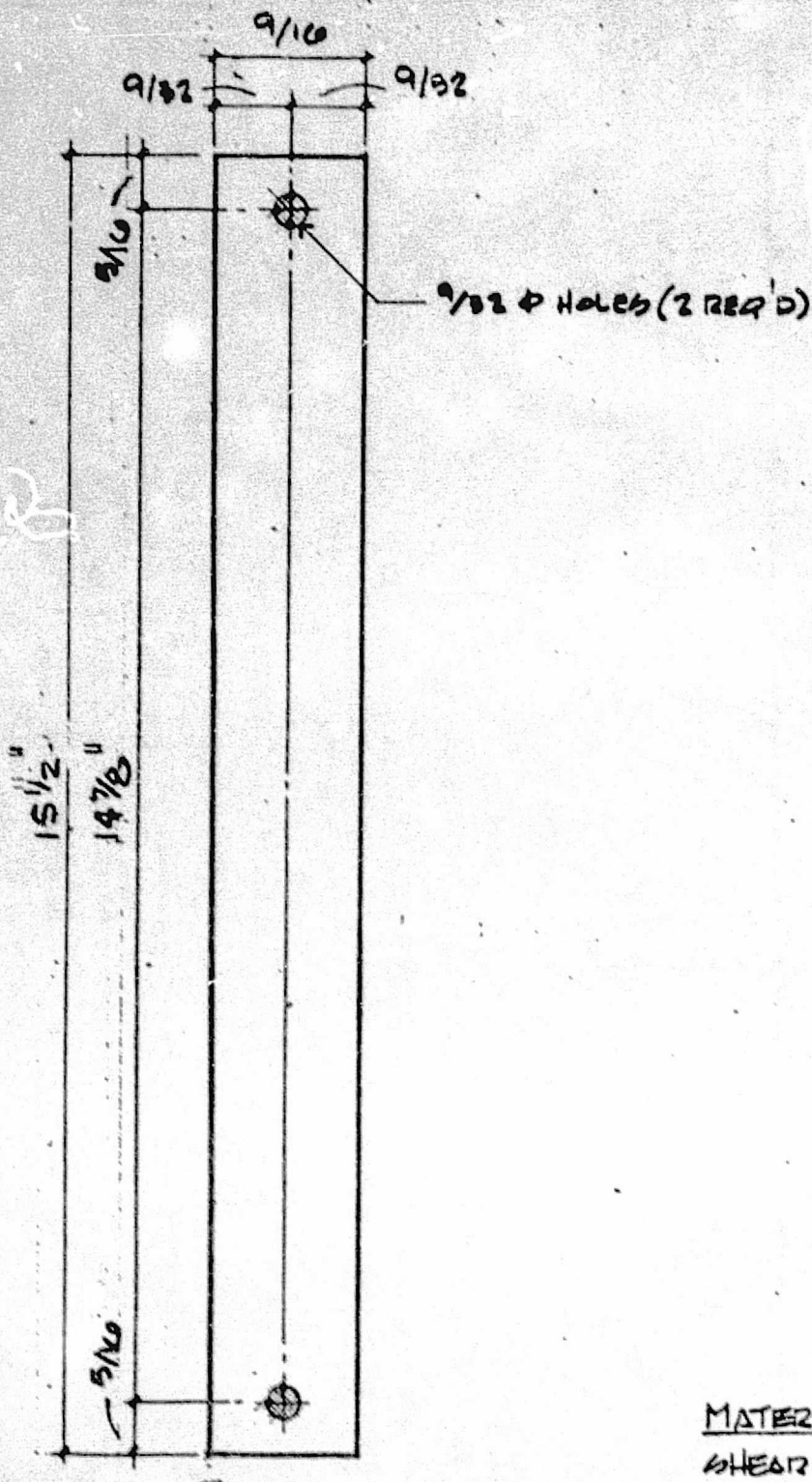
JOINTHORP

HRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

END BEAM
SUB-ASSEMBLY

01-02-007	
DRN 80	CHK
01-25-74	REV

ORIGINAL PAGE IS
OF POOR QUALITY



MATERIAL: 16 GA. STL GALV. (01-01-00)
SHEAR SIZE 9 1/16" X 15 1/2" (0.001 ft²)

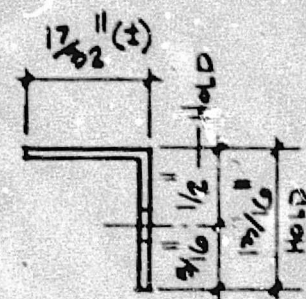
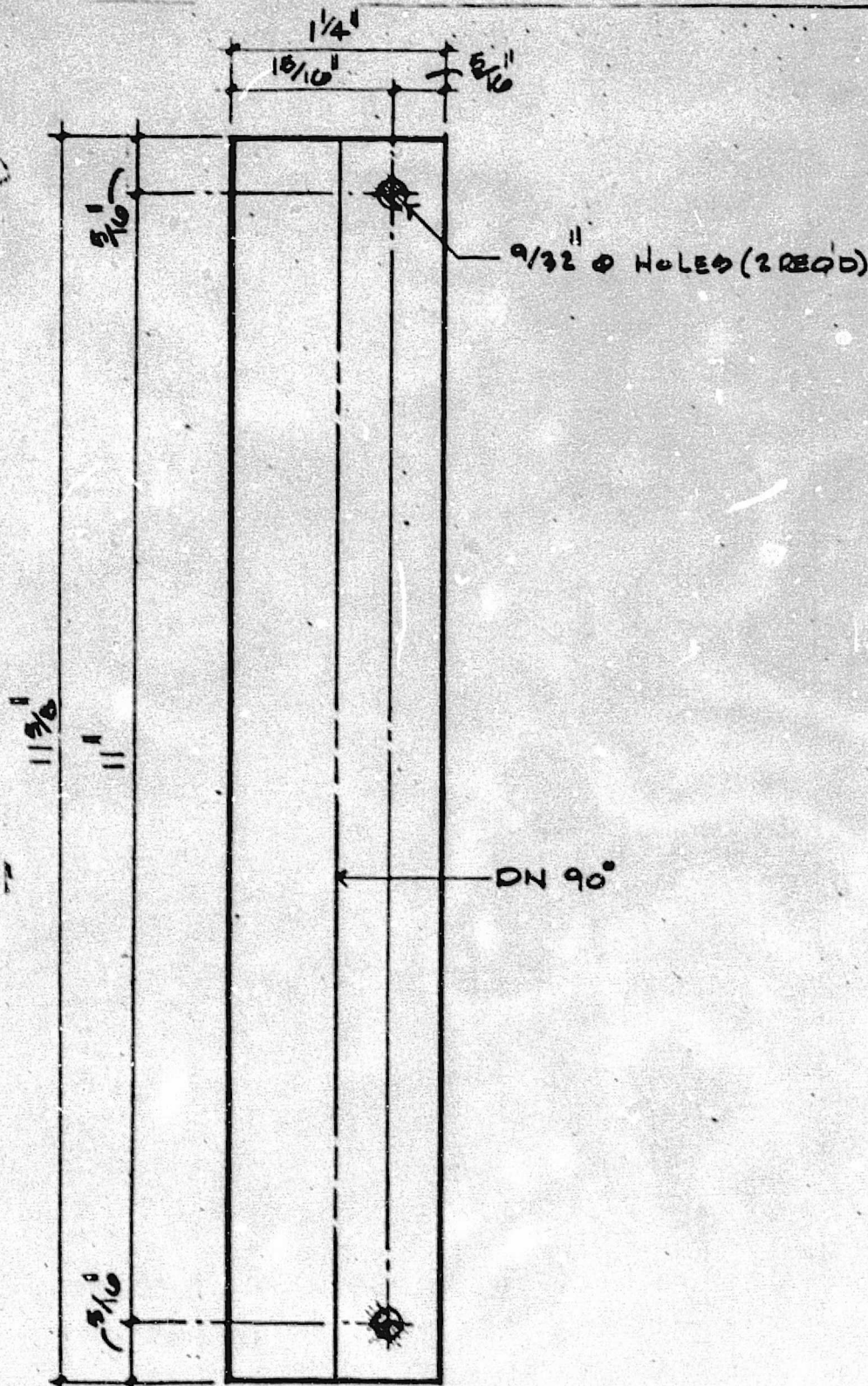
REV. A. 3-30-78 Dwn. W. A.

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

BRIDGING-CROSS
COLLECTOR
PANEL

01-00-001	
DRN OG	CHK
1-13-78	REV A



MATERIAL: 16 GA. DTL
GALV. (01-01-001)
SHEAR SIZE 1 1/4 x 1 5/8 (0.10 ft²)
ALL BENDS 90°, -P16

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

BRIDGING TOP & BOT.
COLLECTOR
PANEL

128

01-00-002	
DRN DG	CHK
11-78	REV

Technical drawing of a rectangular plate with dimensions and hole locations. The drawing includes the following details:

- Overall Dimensions:**
 - Width: $42''$
 - Height: $133\frac{5}{8}''$
- Top Edge:**
 - Offset from top-left corner: $\frac{1}{2}''$
 - UP 90° bend at 0.00
 - Horizontal distance from left edge to first hole center: $13\frac{25}{32}''$
 - Horizontal distance between hole centers: $17\frac{25}{32}''$
 - Horizontal distance from last hole center to right edge: $41\frac{25}{32}''$
- Right Edge:**
 - Vertical distances from top edge to hole centers: $133\frac{5}{8}''$, $133\frac{1}{8}''$, $132\frac{1}{16}''$, $129\frac{1}{16}''$, $109\frac{9}{16}''$, $89\frac{9}{16}''$, $66\frac{13}{16}''$, $44\frac{1}{16}''$, $24\frac{5}{16}''$
 - Bottom edge offset: $4\frac{9}{16}''$, $1\frac{9}{16}''$, $\frac{1}{2}''$
 - Bottom edge offset from right edge: $0.00''$
- Left Edge:**
 - UP 90° bend at 0.00
 - UP 90° bend at 0.00
 - UP 90° bend at 0.00
 - Offset from bottom-left corner: $\frac{1}{2}''$
- Holes:**
 - $\frac{3}{16}''$ HOLES (27)
- Orientation:**
 - Arrow "A" pointing up
 - Arrow "B" pointing right
- Bottom Detail:**
 - Offset from bottom-left corner: $\frac{1}{16}''$, $12\frac{1}{2}''$
 - Offset from bottom-right corner: $42''$
 - Bottom detail dimensions: $9\frac{1}{16}''$, $7\frac{1}{16}''$, $29\frac{13}{16}''$

* ALL INSIDE DIMENSIONS

MTL: 28 GA. GALV. STL. (01-01-007)
42" x 1935/8" 39.97 FT²

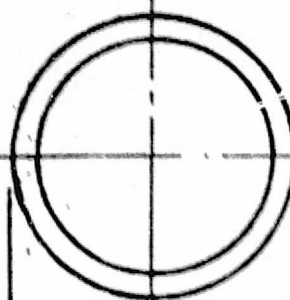
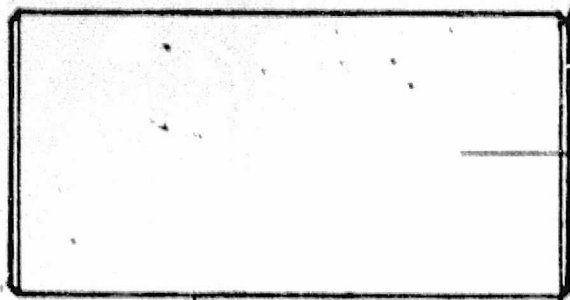
REV. A. 104.3-29-78 6a

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

12-1-77	REV A
---------	-------

NORTH END = $3\frac{7}{8} \pm \frac{1}{32}$ " -005
 SOUTH END = $2\frac{1}{2} \pm \frac{1}{32}$ " -006

DE-BURR EACH END



GRIND TO
 1.484" MIN.
 1.486" MAX.
 DIAMETER

MATERIAL: COLD DRAW, SEAMLESS, STEEL TUBING, ASTM A-519, MECH. GRADE (P/N 01-01-005) 1 1/2" O.D. X 0.109" WALL THK.

FABRICATION: GRIND TO INDICATED O.D. WITH CENTERLESS GRINDER, CUT TO LENGTH ON LATHE OR BY SAWING, DEBURR EACH END. DRILL PULLEY SET HOLE IN NORTH END, -005 ONLY.

01-18-005 NORTHEND

01-18-006 SOUTH END

JOINTHORUP

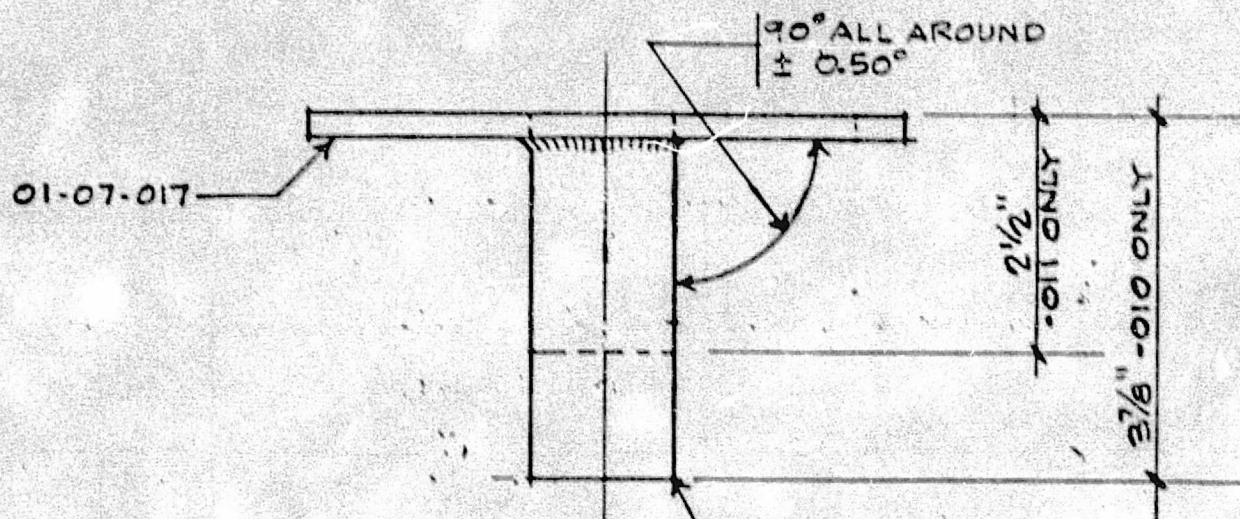
JOINTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SHAFT-N.E.S. END
 COLL'TR PANEL

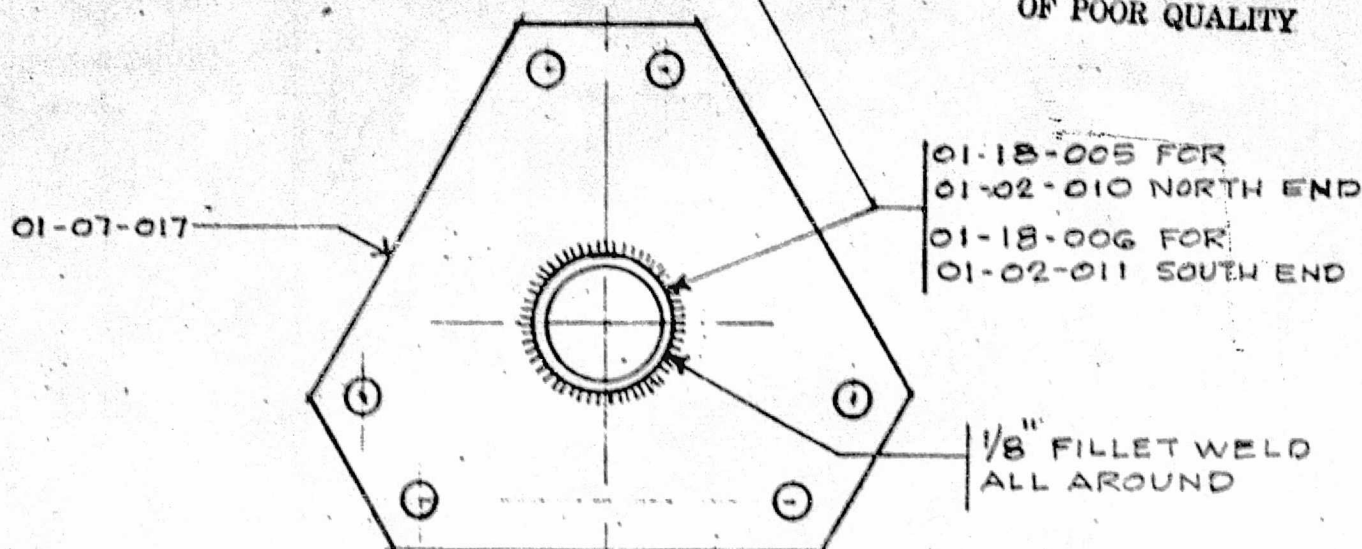
01-18-005 & 006

DRN EY: TCHK

10/26/77 REV A



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P/N	QUANT.		DESCRIPTION
	01-02-010	01-02-011	
01-07-017	1	1	FLANGE
01-18-005	1	NONE	SHAFT
01-18-006	NONE	1	SHAFT
01-01-501	.08 IN ²	.08 IN ³	WELD G. ELECTRODE
01-1G-001	.001 GAL	.001 GAL	MET. CONDITIONER, ZRC
01-1G-002	.004 GAL	.004 GAL	ZINC COATING, ZRC
01-1G-003	.001 GAL	.001 GAL	THINNER, ZRC

FABRICATION & FINISH: WELD PER AWS & AISC. REMOVE LOOSE RUST AND FLUX WITH POWER STEEL BUFFER. CLEAN SURFACES WITH MET. CONDITIONER PER 01-1G-001. COAT ALL SURFACES WITH ZINC COATING (.002" TO .003" THK) AND CURE PER 01-1G-002 & 01-1G-003. STORE, HANDLE & SHIP IN SUCH MANNER AS TO PREVENT DENTS NICKS, FLUX OR DAMAGE TO OUTSIDE SURFACE OF SHAFT.

01-02-010 NORTH END
01-02-011 SOUTH END

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

FLANGED SHAFT ASSBY. 01-02-010 & 011
NORTH & SOUTH END
COLLECTOR PANEL

DRN FW CHK
10-26-77 REV A

Z.R.C. METAL CONDITIONER

- DE-OXIDIZES — NEUTRALIZES RUST
- DE-GREASES — REMOVES GREASES & OILS
- PHOSPHATIZES — FOR MAXIMUM ADHESION

3 STEPS IN ONE EASY OPERATION...

Z.R.C. Metal Conditioner is a new concept in metal surface preparation. Although formulated as a metal pre-treatment for Z.R.C. Cold Galvanizing Compound, it is equally effective to pre-clean and prepare any type of metal surface (ferrous or non-ferrous) for any type of painting.

In one easy operation Z.R.C. Metal Conditioner will:

1. Neutralize rust oxides on any ferrous or non-ferrous metal surface. Because of these de-oxidizing properties, it also acts as an excellent brightener for aluminum, zinc and copper surfaces (including aluminum truck bodies).

2. Removes residual oils and greases by its unique detergent action
3. Slightly etch the metal surface and leave a phosphate deposit that will maximise the adhesion properties of any top-coat.

As an additional convenience and cost saving feature... Z.R.C. Metal Conditioner needs no rinsing or neutralizing — simply...

(A) APPLY (B) ALLOW TO SET 5 MINUTES (C) WIPE the surface is now pre-treated and ready for top-coating

APPEARANCE Blue liquid (very slight solvent odor)
PACKAGING Gallons — Packed 6 Polyethylene jugs per case (shipping weight 53 lbs. per case)
Quarts — Packed 12 Polyethylene bottles per case (shipping weight 27 lbs. per case)

Z.R.C. Metal Conditioner meets and exceeds the requirements of Federal Specification MIL-C-10578 (Type II)

01-16-001

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ZRC CHEMICAL PRODUCTS CO.

21 NEWPORT AVE., QUINCY, MASS. 02171 TEL. 617/328-6700

Z.R.C. is a liquid compound containing 95% zinc in the dried film, that fuses to clean iron, steel or aluminum through electrochemical action to provide maximum protection against rust and rust creepage.

Z.R.C. vs. PAINT

It is important that there is an understanding of the conceptual difference between Z.R.C. and paint.

While all types of paints provide only a "skin" protection, Z.R.C. imparts cathodic action against corrosion — i.e., in the presence of moisture its metallic zinc content becomes an anode and the underlying surface a cathode. Corrosion attacks the zinc leaving the base metal untouched.

If the "skin" of a paint is broken, in any way, it will rust in that area and also allow rust creepage under the break. However, if Z.R.C. is scratched to the bare metal the zinc will form an insoluble zinc salt on the exposed area. This heals the break and continues to protect the surface against any corrosion.

Thus — Z.R.C. will not allow rust creepage.

Color: Matte flat light gray.

Packaging: 3-1/2 gallon pails, gallons, quarts, half-pints and aerosol cans.

- One package • No premixing • Unlimited pot-life
- Unlimited shelf-life • Ready to apply

APPLICATION METHODS - COVERAGE

APPLICATION. Z.R.C. may be applied by brush, spray, dip or roller.

SPRAY (Low pressure compressor type). Atomizing pressure 50 p.s.i. Orifice of tip 0.080 ($\frac{8}{1000}$ ths) ± 5 . Viscosity — Reduce Z.R.C. in ratio of 4 parts Z.R.C. to 1 part XXX Thinner*.

SPRAY (Airless type). Pressure 650-750 p.s.i. Orifice of tip 0.013-0.023 ($\frac{13}{1000}$ to $\frac{23}{1000}$). 0.018 ($\frac{18}{1000}$) generally delivers optimum performance. Viscosity — No reduction required.

BRUSH OR ROLLER — No reduction required. Apply as received from container.

DIPPING — Reduce Z.R.C. in ratio of 3 parts Z.R.C. to 1 part XXX Thinner*.

DRYING — When Z.R.C. is air dried, it is set to touch in 20-30 minutes and may be re-coated in 12 hours.

CURING — Z.R.C. requires curing before being exposed to severe service. When air-dried, it cures progressively up to 14 days. Curing may be accelerated to a matter of minutes if heat is applied. Suggested cycle for full cure is 300°F for 30 minutes.

FLASH POINT — Z.R.C. has a safe flash point of 104°F and thereby enables its use freely around welding operations.

COVERAGE — 400-500 square feet per gallon. An average brush coat of Z.R.C. will deposit 1.5-2.0 mils (dry film thickness). This is generally sufficient for "regular" environment exposure. Two coats are suggested for severe exposure conditions.

*XXX Thinner is our special solvent — available in drums.

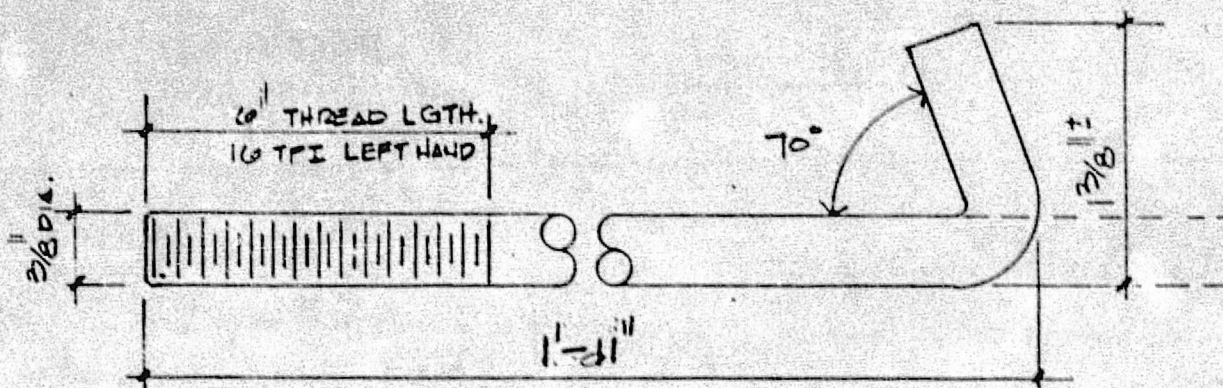
01-16-002 AND 01-16-003

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

METAL CONDITIONER
ZINC COATING AND
THINNER

01-16-001,
-002 & -003
DRN FW CHK
10/26/77 REV



NOTE: HOT DIP GALV. (.125 OZ OF
SPELTER PER/FT²) AFTER
FABRICATION.

MATERIAL = 3/8" DIA. A36 STL. 200
LENGTH PRIOR TO BEND 2'-0"
(CO-01-012)

REF. 01-04-005, 01-04-006 & 01-04-025

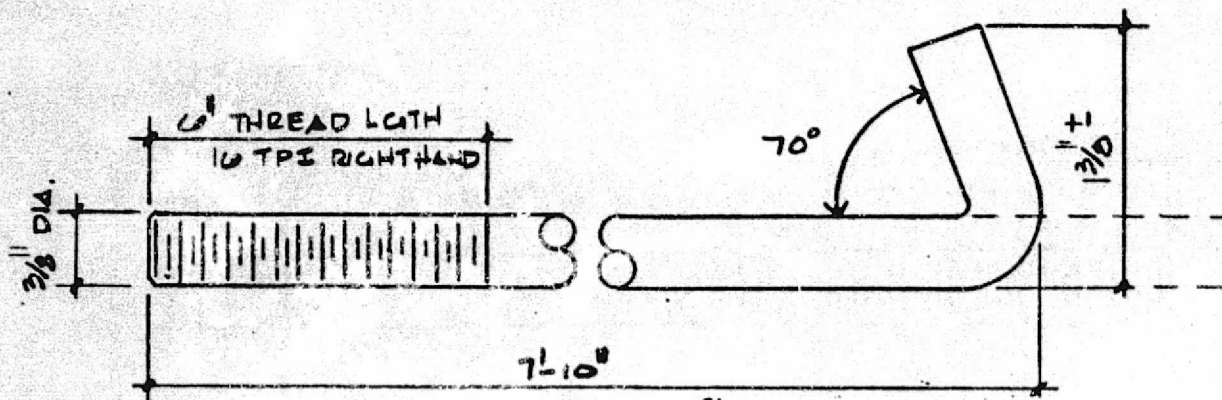
VOITH

VOITH, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

WIND BRACE LOWER
TWO LOWER END FOR ALL
WIND BRACE ASSEMBLY

01-17-098	
DRN	CHK
3-1-78	REV

ORIGINAL PAGE IS
OF POOR QUALITY



NOTE: HOT DIP GALV. (.125 OZ OF
SPELTER PER/FT²) AFTER
FABRICATION.

MATERIAL: 3/8" DIA., A36, STL ROD.
LENGTH PRIOR TO BEND 7'-11"
(00-01-012)

REF. 01-04-005 AND 01-04-006

NORTHROP

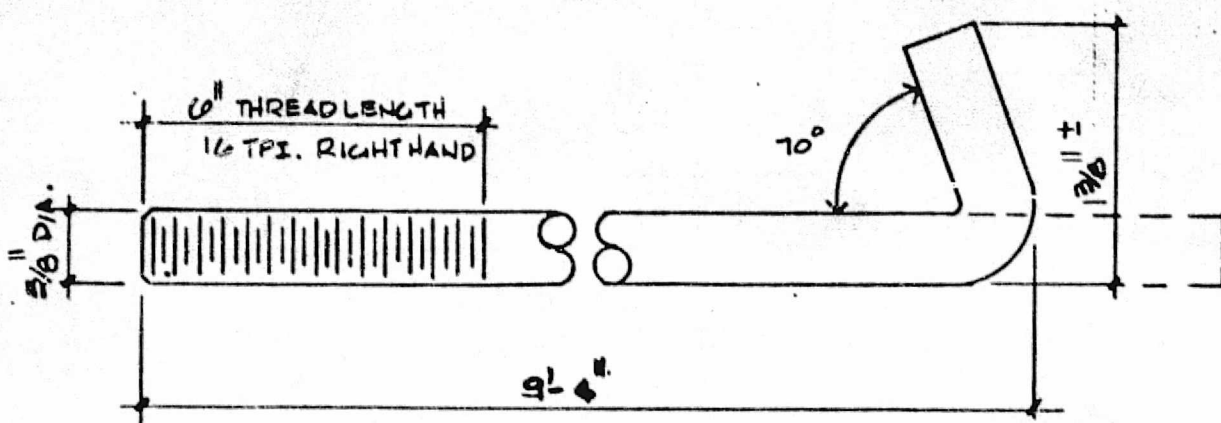
NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

NORTH AND SOUTH (UPPER)
END
WIND BRACE.

01-17-100

DRN 69 CHK

3-1-73 REV



NOTE: HOT DIP GALV. (.125 OZ. OF
SPELTER PER/FT²) AFTER
FABRICATION

MATERIAL: 3/8" DIA, A36, STL. ROD
LENGTH PRIOR TO BEND. 9'-5"
(00-01-012)

REF. 01-04-035

JOINTHORUP

JOINTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

NORTH (LOWER)
UPPER WIND BRACING.

01-17-099	
DRN <i>LN</i>	CHK
0-1-73	REV

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Mulchina, Texas 75141

LIST OF MATERIALS

01-03-043

DATE 1-10-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

INCLINED STRUT

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-043 INCLINED STRUT

01-06-039 STRUT - 16 GA. GALV. 12x144 (12#)

01-06-022 FLANGE STIFFENER, 16 GA. GALV (.125d) 6x3

01-17-003 SCREWS - #8x1/2 G.D. & ST.

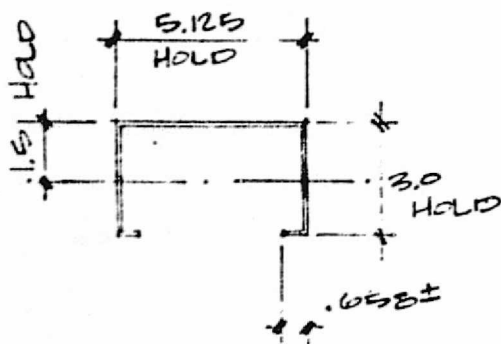
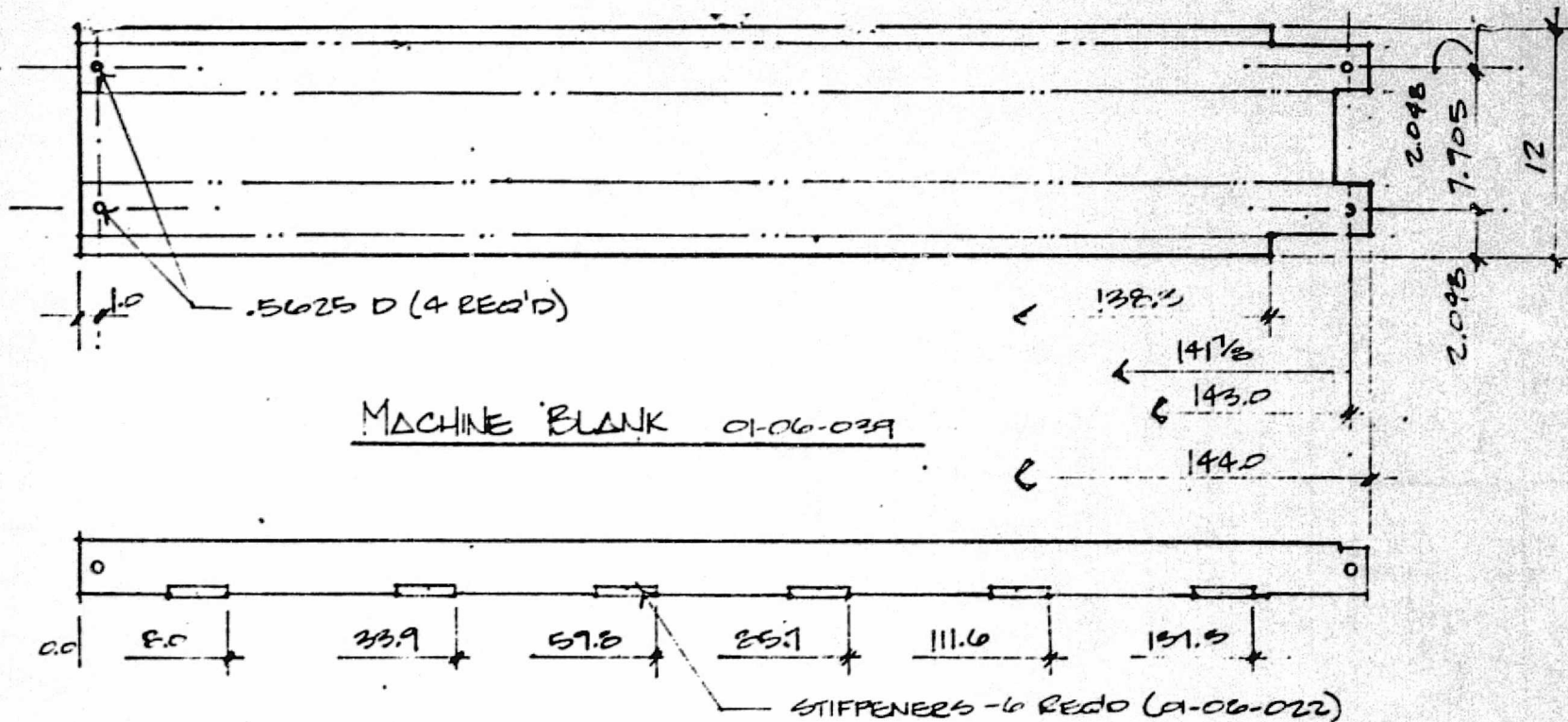
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ORTHURUP

INCLINED STRUT
ASSEMBLY

⑦

01-03-043	DRN
26	CHK
	RFV



POST FORM DIMENSION

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REF GHT/DRWG# 01-03-043
FOR WORK THIS SHEET

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

INCLINED TREST

01-06-02A

DRN

CHK

REV

SHOP FINAL
ASSEMBLY

PART/ASSEMBL

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

01-03-006

DATE 1-14-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

CONTROL BOX
MOUNT

REV A SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

2

01-03-006 CONTROL BOX MOUNT.

1

01-06-059 CONTROL BOX MOUNT, 16 GA. GALV. 12X26 (2.17 FT²)
(01-001)

3

01-06-010 FLANGE STIFFENERS, 16 GA. GALV. 6X3 (.125 FT²)
(01-001)

18

01-17-003 SCREWS, #3 X 1/2 S.D. & S.T.

2

01-06-134 SHIM, CONTROL BOX, EAST SIDE, 16 GA GALV. (01-001)
45/16 X 3 (.096 FT²)

2

01-06-135 SHIM, CONTROL BOX, WEST SIDE, 16 GA GALV. (01-001)
45/16 X 3 (.096 FT²)

9

01-17-010 3/8 DIA. X 3/4, BOLT, HEX

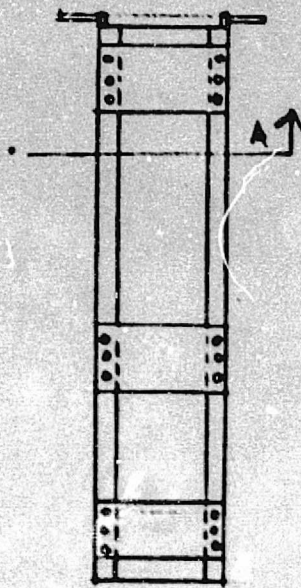
9

01-17-011 3/8 DIA. NUT, HEX

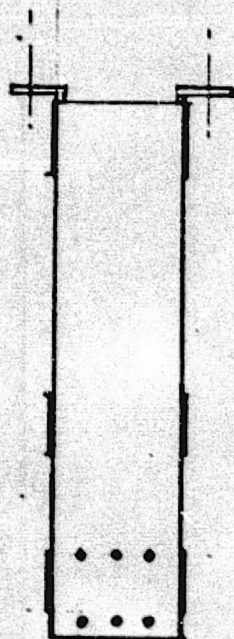
9

01-17-012 3/8 DIA. LOCK WASHER

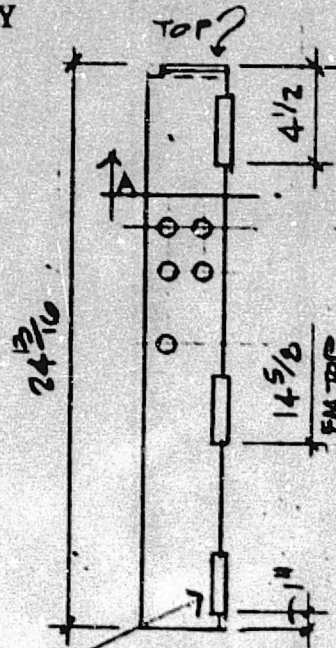
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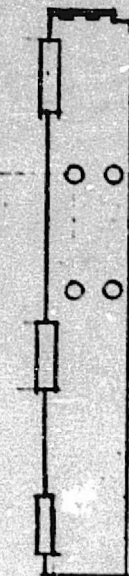
FRONT



BACK

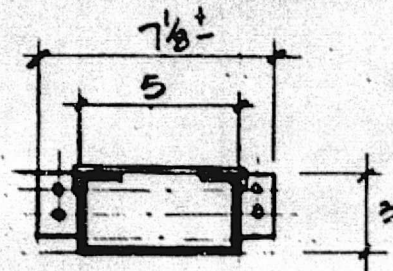


LEFT



RIGHT

FLANGE STIFFENER (01-06-010)
W/6 - #8 SCREWS (01-07-008)



SECTION A.

NOTE: 1 ASSEMBLY FITS EITHER
SIDE OF CONTROL BOX

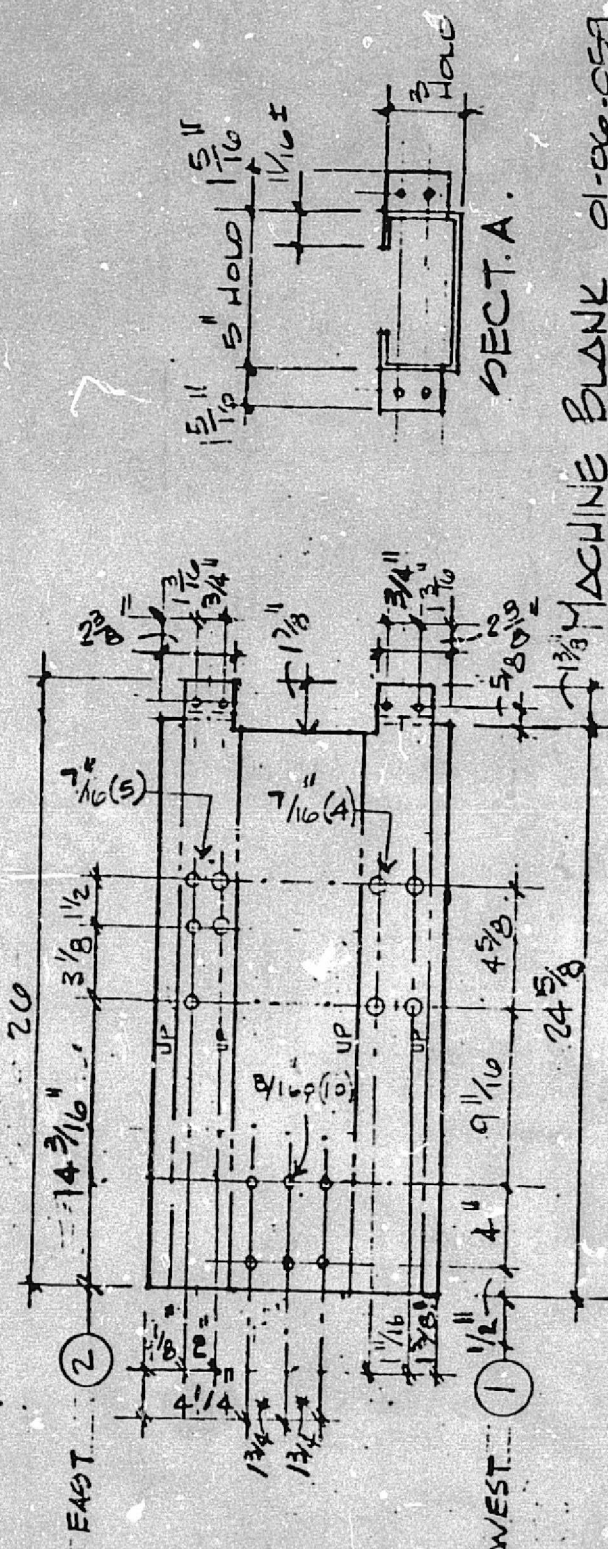
REV. (A) REDRAWN 3-24-74

NOIRTHORUP

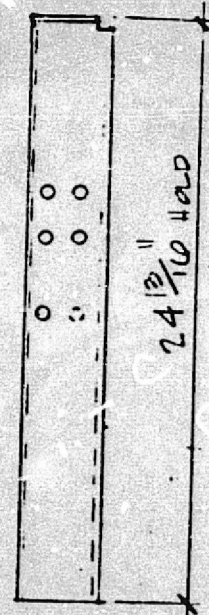
NOIRTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CONTROL BOX MOUNT
FINAL SHOP ASSEMBLY

01-03-066	
DRN 26	CHK
1-17-70	REV 1



01-06-059 MACHINE BLANK

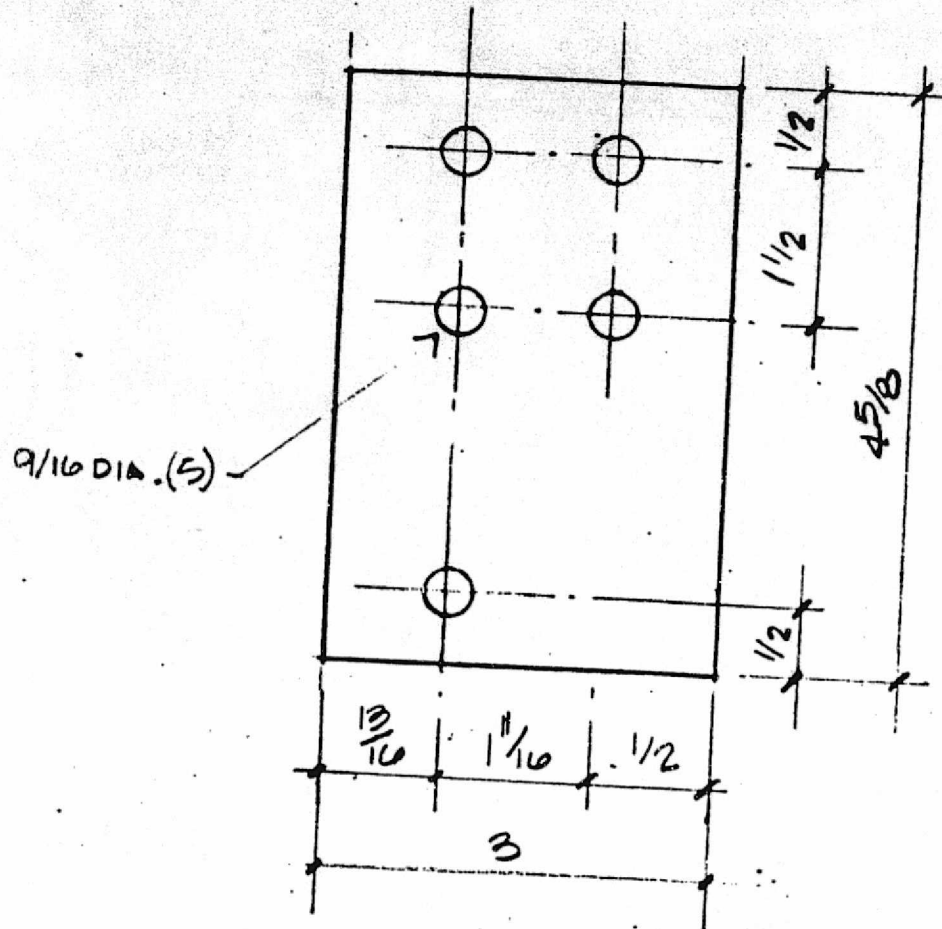


CONTROL BOX MOUNT
NOT TO SCALE
16 GA GALV. (21-01-001)
SHEAR SIZE 12x28 (2.17 FT.)

NOTE: 1 ASSEMBLY FITS EITHER EAST OR WEST SIDE OF CONTROL BOX. 2 ASSEMBLY REQ'D TO MOUNT CONTROL BOX.

01-06-059	
DRN Eb	CHK
1-11-78	REV A

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MATERIAL

16 GA. GALV STL
4 5/8 x 3 (-096)

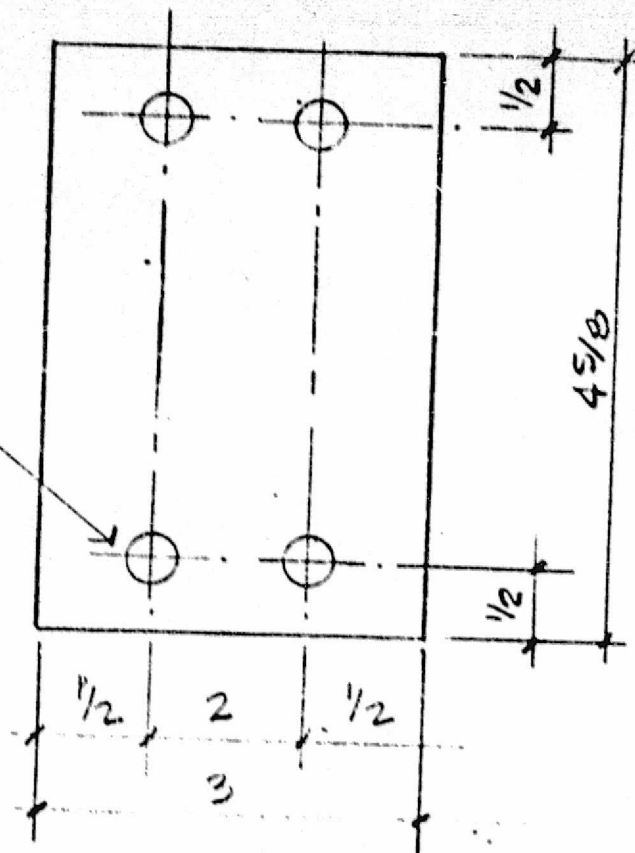
JOINTHORUP

JOINTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SHIM
CONTROL BOX
EAST SIDE

01-06-134	
DRN bg	CHK
2-55-72	REV A

9/16 DIA (4)



MATERIAL

16 GA. GALV. STL
45/8 X 3 (096)

INVENTORY

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-067

DATE 2-1-78

FIELD SUB-ASSEMBLY - PART
 SHOP FINAL ASSEMBLY - PART
 SHOP SUB-ASSEMBLY - PART
 PART

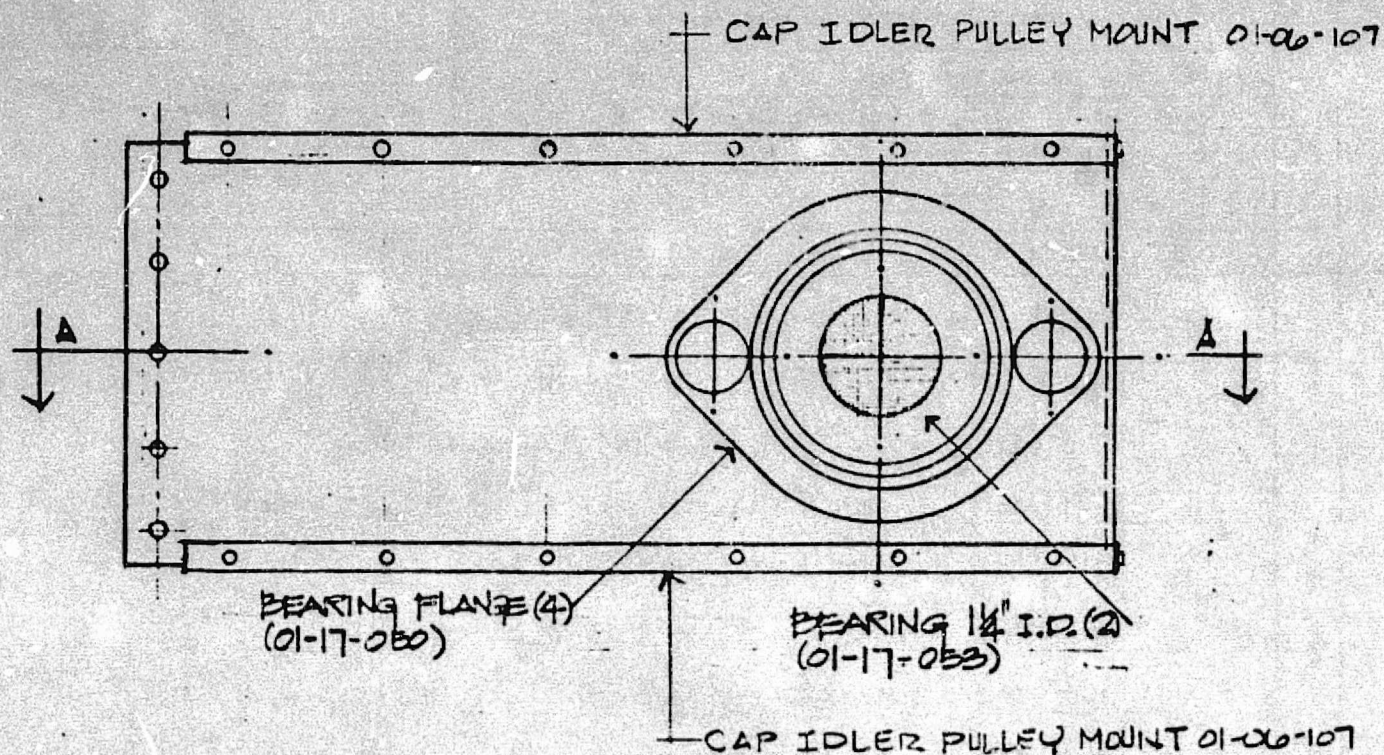
IDLER PULLEY
 MOUNT ASSEMBLY
 REV 1 of 1

PART NO. / REV / DESCRIPTION

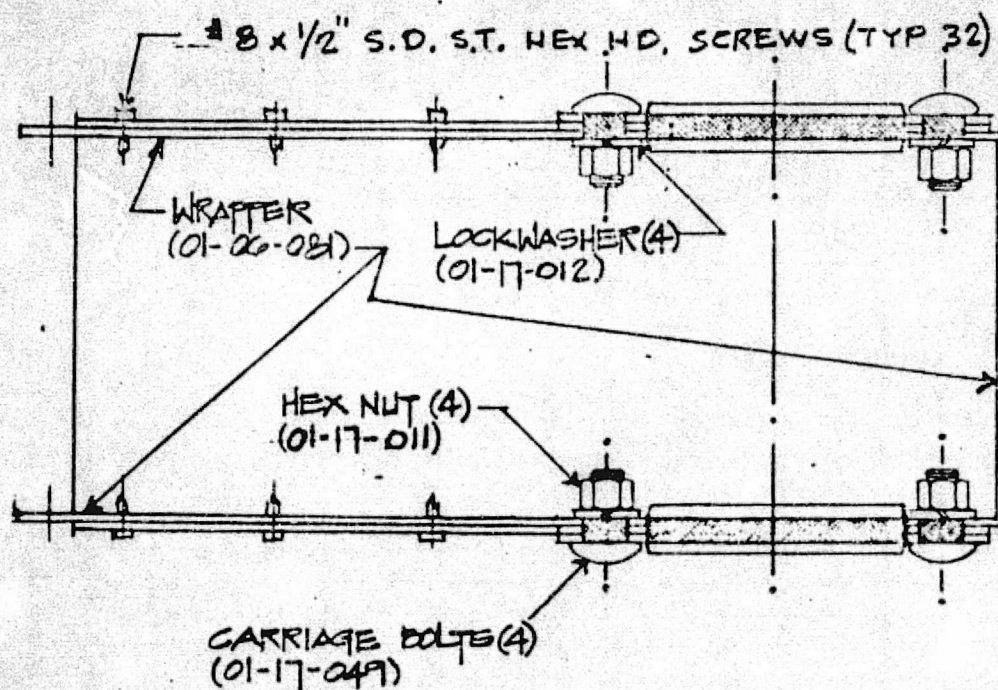
01-03-067 IDLER PULLEY MOUNT ASSEMBLY

1	01-06-081	WRAPPER, 16 GA. GALV. 5 X 16 1/16 (.58 FT ²)
4	01-17-050	FLANGES, CADMIUM PLATED STEEL
4	01-17-049	CARRIAGE BOLTS 3/8-16 X 3/4" ZINC PLATED
4	01-17-052	LOCKWASHER 3/8" DIA. ZINC
4	01-17-051	NUTS, HEX 3/8-16 ZINC PLATED (UNC)
2	01-17-053	BEARING 1 1/4" I.D.
2	01-06-101	CAP IDLER PULLEY MOUNT 5/16 X 5/8 16 GA. GALV. STL. (0.21 FT ²)
32	01-17-008	3 X 1/2 S.D. S.T. SCREWS, ZINC.

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TYP. SIDE



SECTION A-A

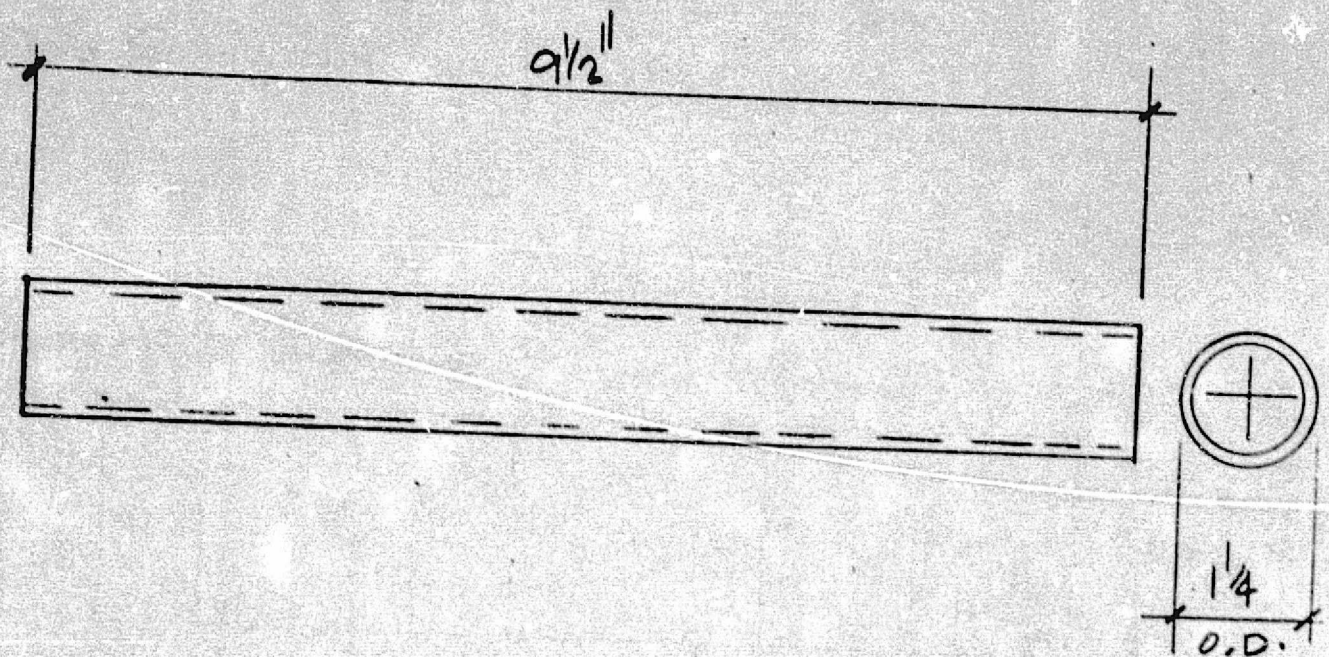
REV (A) REDRAWN 3-25-78 by

NORTHROP

IDLER PULLEY
MAINT ASSEMBLY

01-03-067	
DRN RDS	CHK RB

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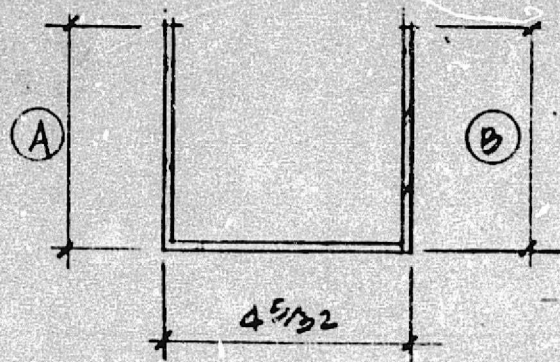
MATERIALS 1/4 O.D x .095
DRAWN SEAMLESS TUBING SPEC
A-519 MECH. GRADE.

NORTHROP

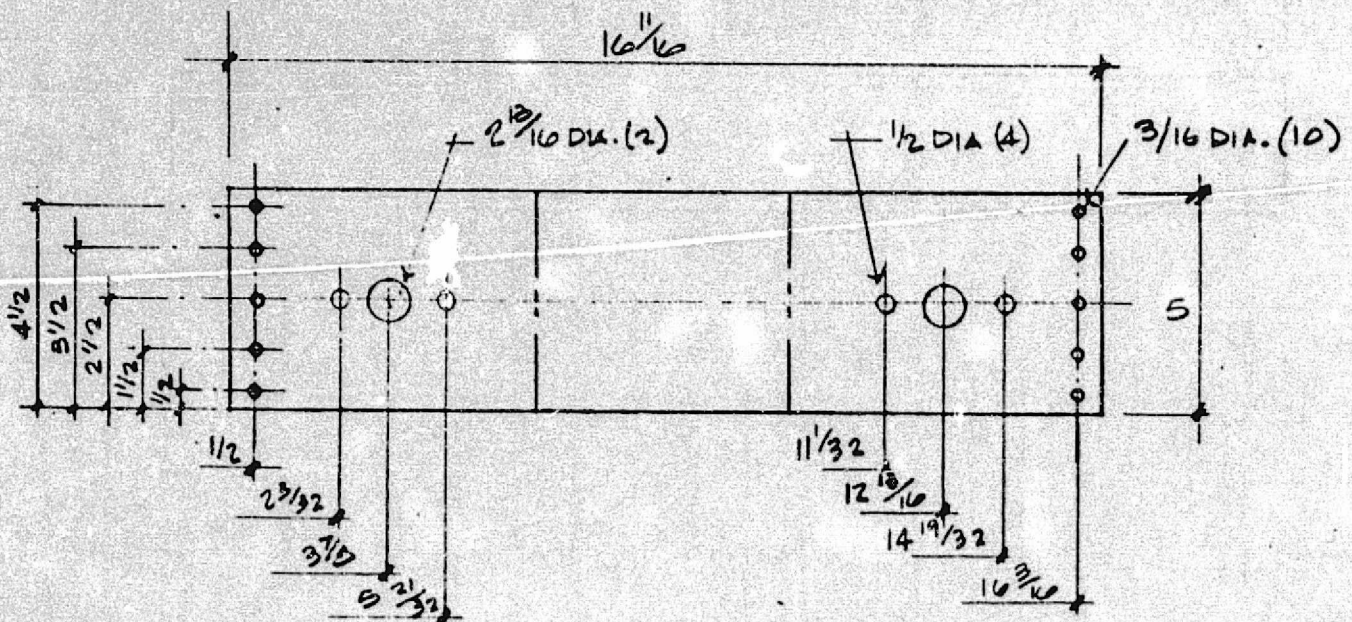
NORTHROP, INCORPORATED 322 Nichols Drive, Muehling, Texas 75141

REF. 01-04-009
IDLER PULLEY
SHAFT

01-18-009	
DRN 69	CHK
1-7-74	REV



MAKE (A) = (B) 6 3/8"



MATERIAL:

16 GA. GALV. STL

SHEAR SIZE 5X16 1/16 (.53 FT²)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

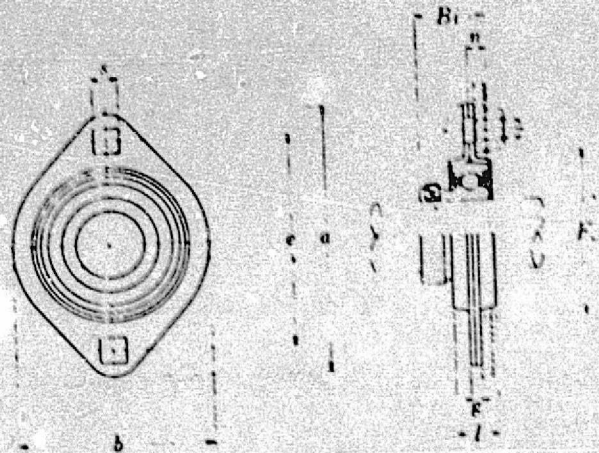
WAPPER
IDLER PULLEY

01-06-031	
DRN 69	CHK
3-25-73	REV

ASPFL 2

Set Screw Type
Normal Duty

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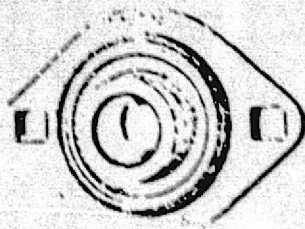


Shaft Dia. in.	Complete Flanged Unit Number	Nominal Dimensions in.								Max. Radial Load Free End lb.	Bearing Number	Basic Load Rating lbs.		Housing Number
		a	e	g	s	t	b	B1	n	F min.		Dyn. C	Static Co	
1 1/4	ASPFL 206-1 1/4	4 1/4	3 1/4	.205	.433	1/8	3 1/4	1.142	315	2 1/2	1100	3350	2250	PFL 206

Flanged Units Pressed Steel Housing (Two Bolt)

Set Screw

ASPFL 2 (for light load)



With two mounting bolt holes, this like its cast iron counter-part is designed for the least possible mounting space. The bearing housing being separable, this type of unit can be mounted very easily.

NOTE:

FLANGES TO BE ZINC COATED

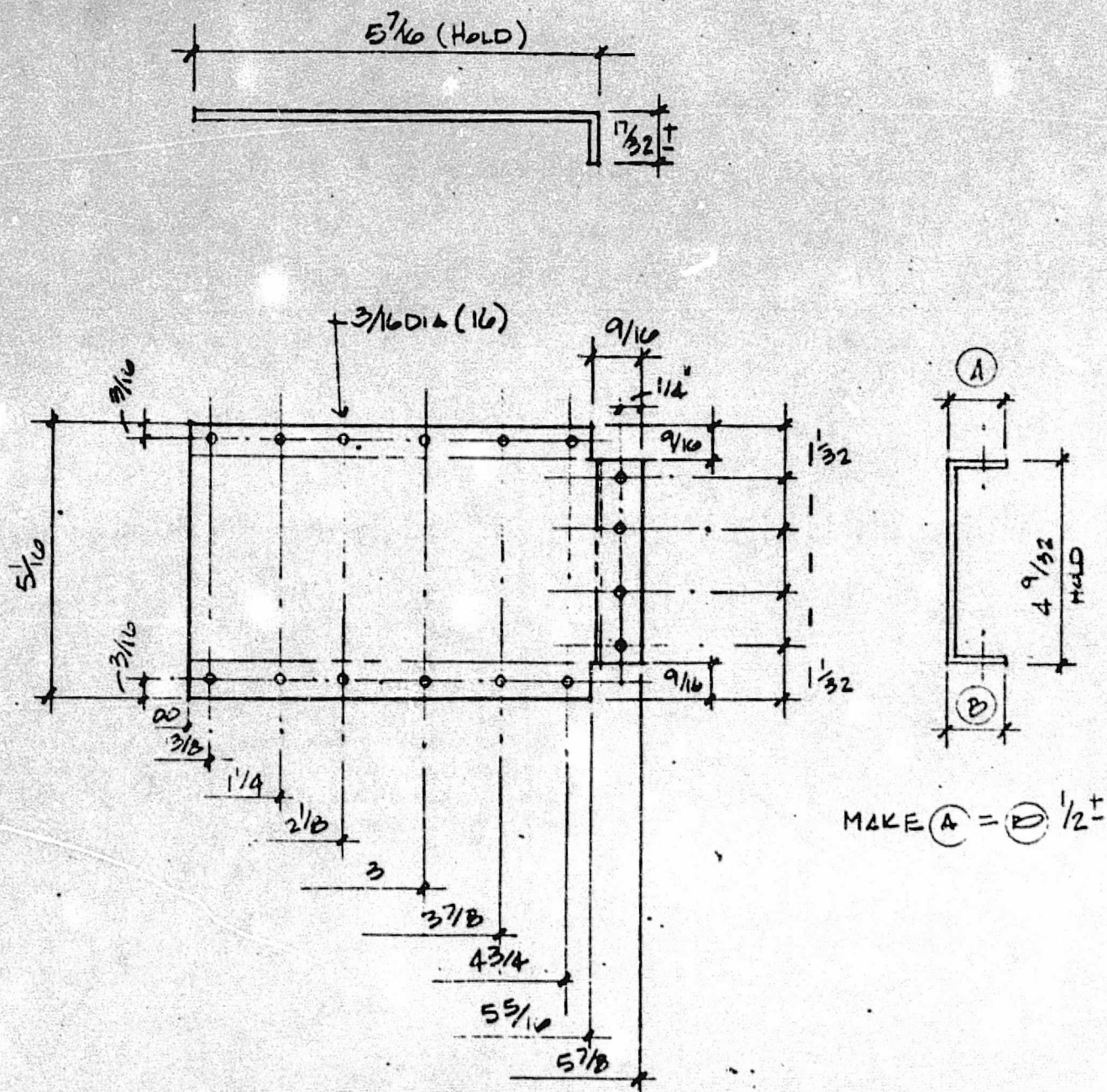
WORTHINGTON

WORTHINGTON, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

IDLER PULLEY
MOUNT BEARING

01-17-05

DRN *bm* CHK
4-27-76 REV



MATERIAL:
 16 GA GALV. STL (01-001)
 5 1/16 x 5 7/8 in. (0.21 FT²)

ORTHORUP

P. INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CAP
 IDLER PULLEY MOUNT

01-06-107	
DRN	CHK
69	
2-25-70	REV

FIELD SUB-ASSEMBLY - PART
 ↳ SHOP FINAL ASSEMBLY - PART
 ↳ SHOP SUB-ASSEMBLY - PART
 ↳ PART

MANIFOLD STRUT
 3/4" (Wt) #10
 REV CUT. 1 OF 1

PART. NO. / REV / DESCRIPTION

	01-03-044	MANIFOLD STRUT
1	01-03-031	STRUT, 10 GA. GALV, 11 1/2 x 15 (11.93#)
1	01-03-033	STRUT COVER, 10 GA. GALV, 11 1/2 x 6 1/4 (4.71#)
72	01-17-008	SCREWS #8 x 1/2, 60. ST.
1	01-15-008	INSULATION 1.5 FT ³
1	01-03-002	MANIFOLD, COPPER TYPE "M", 3/4 x 11 1/2
4	01-03-001	POSITIONING PLATE, 10 GA. GALV, 3 1/8 x 7 1/8 (.19#)
4	01-03-001	CLIPS, 10 GA. GALV, 3 x 4 (.09)
1	01-21-004	WEATHER STRIPPING 31 INCHES
2	01-17-046	WIRE-TY

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NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Mulchina, Texas 75141

LIST OF MATERIALS

01-03-045

DATE 1-10-48

FIELD SUB-ASSEMBLY - PART
 SHOP FINAL ASSEMBLY - PART
 SHOP SUB-ASSEMBLY - PART
 PART

MANIFOLD STRUT

3/4" (114) # 11

REV

QNT. 1 of 1

PART. NO. / REV / DESCRIPTION

01-03-045 MANIFOLD STRUT

1	01-00-031	STRUT, 16 GA. GALV, 11 1/2 x 15 (11.93)
1	01-00-033	STRUTCOVER, 16 GA. GALV, 11 1/2 x 6 1/4 (4.91)
72	01-11-003	SCREWS #8 x 1/2, 60. & 60.
1	01-13-003	INSULATION 1.5 FT3
1	01-00-003	MANIFOLD, 3/4" 113 3/4 TYPE M COPPER
4	01-00-041	POSITIONING PLATE, 16 GA. GALV, 3 1/2 x 1 1/2 (1.14)
4	01-00-001	CLIPS, 16 GA. GALV, 3/4 x 1 (.09)
1	01-21-004	WEATHER STRIPPING 31 INCHES REQ'D
2	01-17-046	WIRE-TY

INVENTORY

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-046

DATE 1-10-18

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

MANIFOLD STRUT

1 ϕ #

(12)

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-046 MANIFOLD STRUT

1 01-00-031 STRUT, 16 GA. GALV, 11 1/2 x 15 (11.93 ϕ)

1 01-00-033 STRUT COVER, 16 GA. GALV, 11 1/2 x 6 1/4 (4.71 ϕ)

72 01-11-008 SCREWS #8 x 1/2, S.D. & E.T.

1 01-13-009 INSULATION 1.5 FT³

1 01-03-004 MANIFOLD, 1 ϕ (1/4" ID) x 11 3/32 TYPE M COPPER

4 01-00-042 POSITIONING PLATE, 16 GA. GALV, 3 1/8 x 7 1/8 (.19 ϕ)

4 01-00-001 CLIPS, 16 GA. GALV, 3 x 4 (.09)

1 01-21-004 WEATHER STRIPPING 3 INCHES 125 ϕ D

2 01-17-046 WIRE-TY

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NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-041

DATE 1-10-18

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

MANIFOLD STRUT

1" ϕ (NOM) #13

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-041 MANIFOLD STRUT

01-00-031 STRUT, 16 GA. GALV, 11 1/2 x 15 (11.93#)

01-00-033 STRUT-COVER, 16 GA. GALV, 11 1/2 x 6 1/4 (4.71#)

01-11-008 SCREWS #8 x 1/2, S.D. & G.T.

01-13-000 INSULATION 1.5 FT³

01-00-005 MANIFOLD, 1" (NOM) x 118 3/16 TYPE M COPPER

01-00-042 POSITIONING PLATE, 16 GA. GALV, 3 1/2 x 7 1/2 (.19#)

01-00-001 CLIPS, 16 GA. GALV, 3 x 4 (.07)

01-21-024 WEATHER STRIPPING 31 INCHES REQ'D

01-17-046 WIRE TY

INTEGRITY

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-048

DATE 1-10-18

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

MANIFOLD STRUT

1/4" ϕ (NOMINAL) #14

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-048 MANIFOLD STRUT

01-03-031 STRUT, 16 GA. GALV, 11 1/2 x 15 (11.93#)

01-03-033 STRUT COVER, 16 GA. GALV, 11 1/2 x 6 1/4 (4.71#)

01-17-008 SCREWS #8 x 1/2, S.D. & S.T.

01-13-003 INSULATION 1.5 FT³

01-03-006 MANIFOLD, 1/4" ϕ (L6H) x 11 1/2" 16 TAFE M COPPER

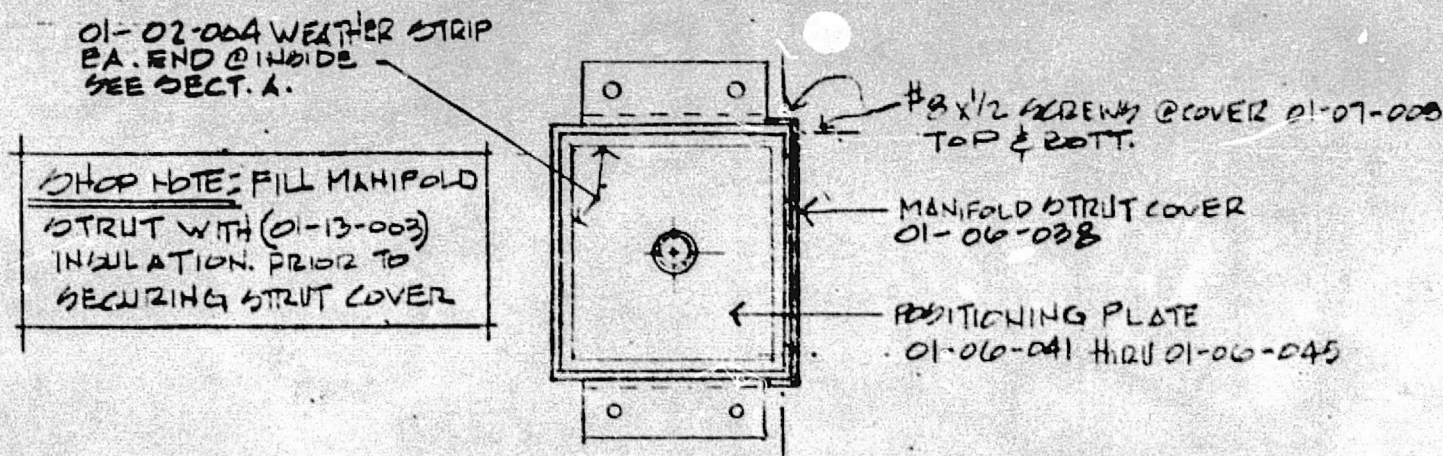
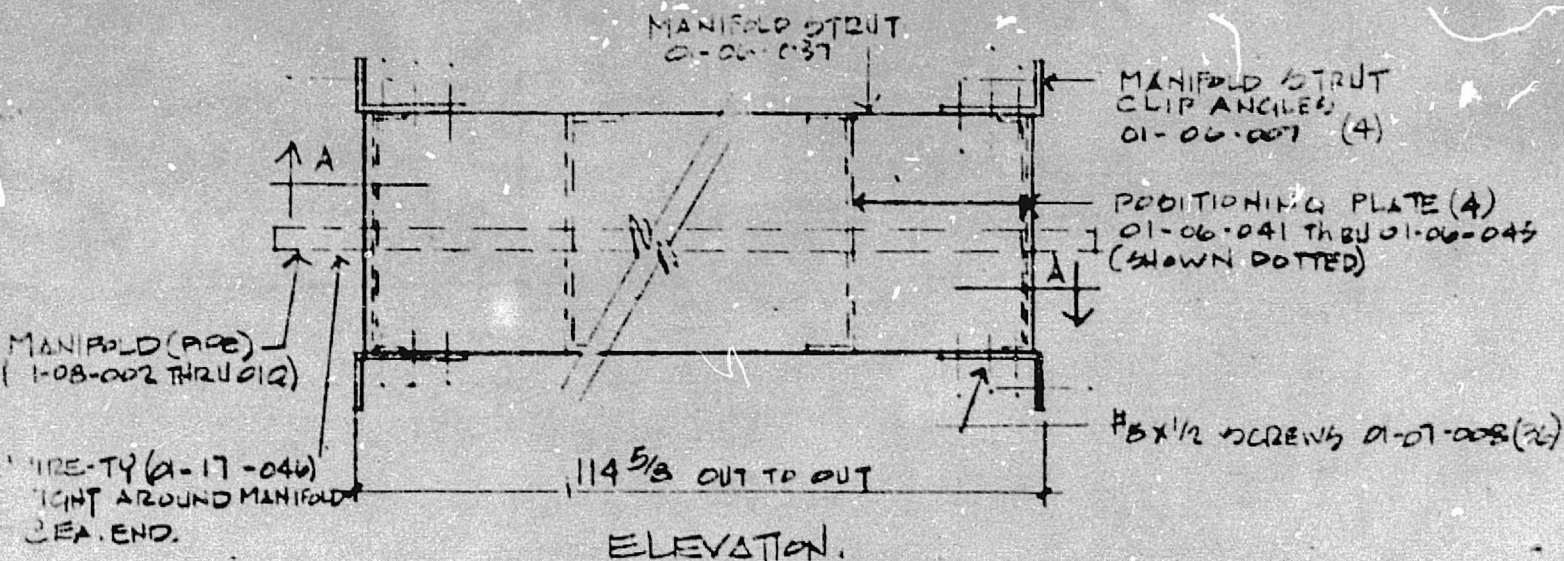
01-03-043 POSITIONING PLATE, 16 GA. GALV, 3 1/2 x 1 1/2 (.19#)

01-03-001 CLIPS, 16 GA. GALV, 3 x 4 (.09)

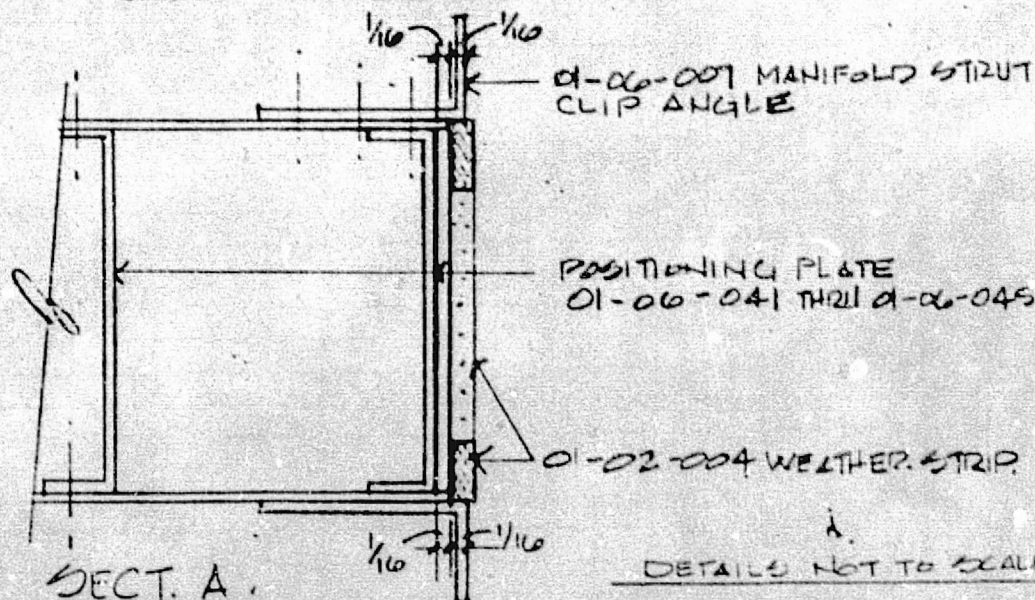
01-21-024 WEATHER STRIPPING 31 INCHES REQ'D.

01-17-046 WIRE - T4

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NOTES:
LOCATION OF FASTENERS
DETERMINED BY PILOT
HOLES IN STRUT (FOR
POSITIONING PLATES AND
STRUT COVER)



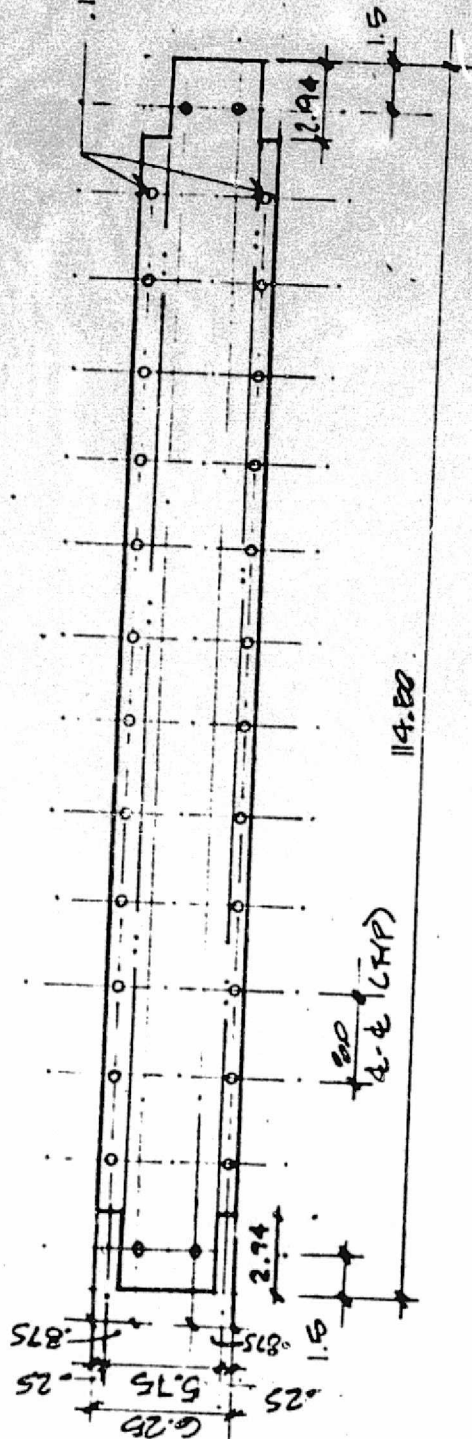
VOITHORUP

THURP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

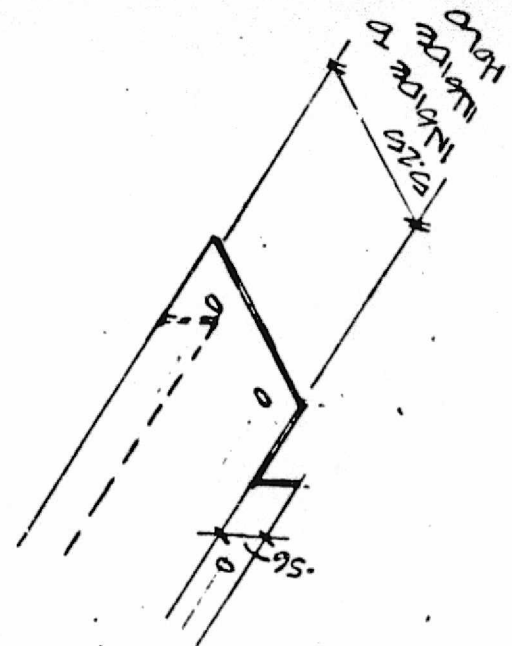
MANIFOLD STRUT

01-03-044 THRU 01-03-048	CHK
DRN R6	
10-27-77	REV A

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STRUT LID
REF. 01-03-044 TEL-048
W. G. CALW. RECD (01-01-01)
SHEAR 5126 114.80 x 20
ALL BENDS 90°



NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

MANIFOLD
STRUT COVER

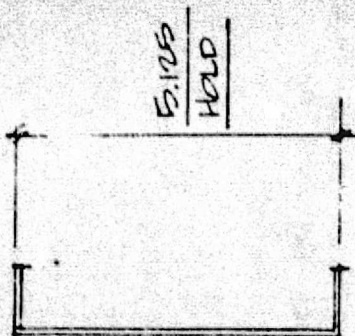
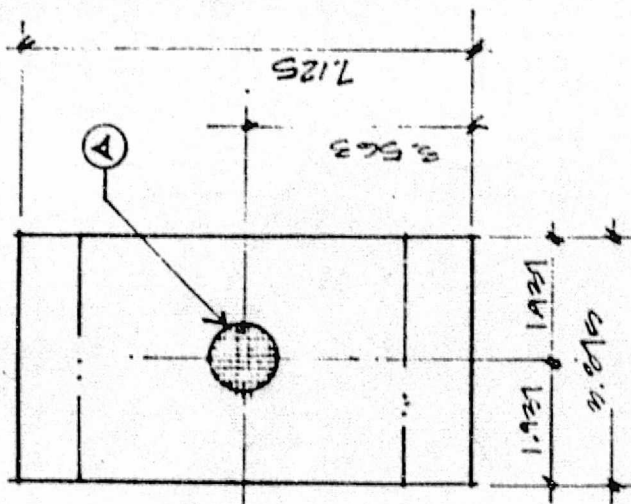
01-06-03B		
DRN	RB	CHK
02-28-77		REV

JOINTHORUP

THRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

MANIFOLD POSITIONING PLATE

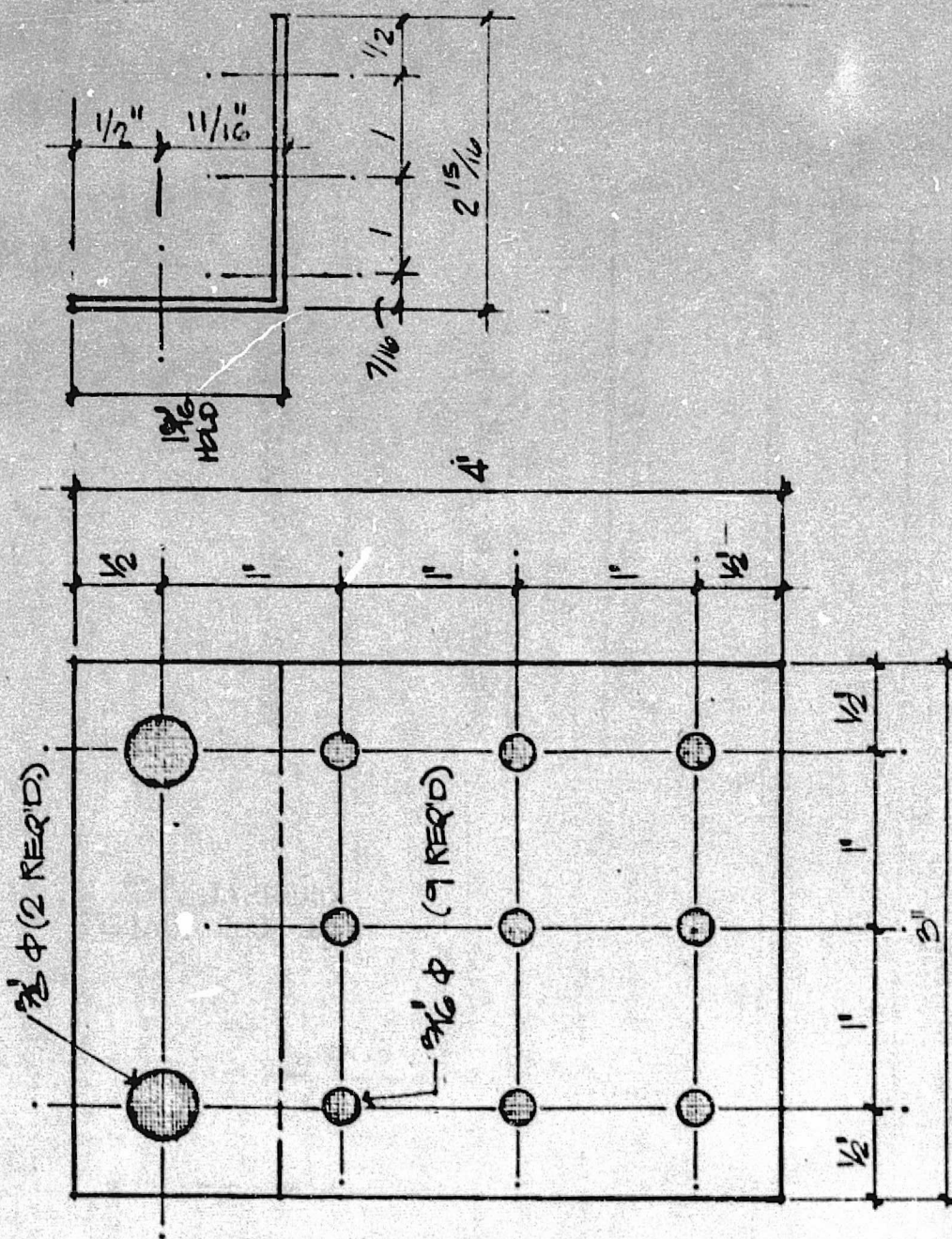
01-06-041 TO -045		
DRN	RB	CHK
10-01-71		REV



A DIA.	PART #	ASSEMBLY #
1.931	01-06-041	01-03-044
1.875	01-06-042	01-03-046
1.931	01-06-043	01-03-047
1.875	01-06-044	01-03-048
2.000	01-06-045	01-03-049

MANIFOLD POSITIONING PLATE

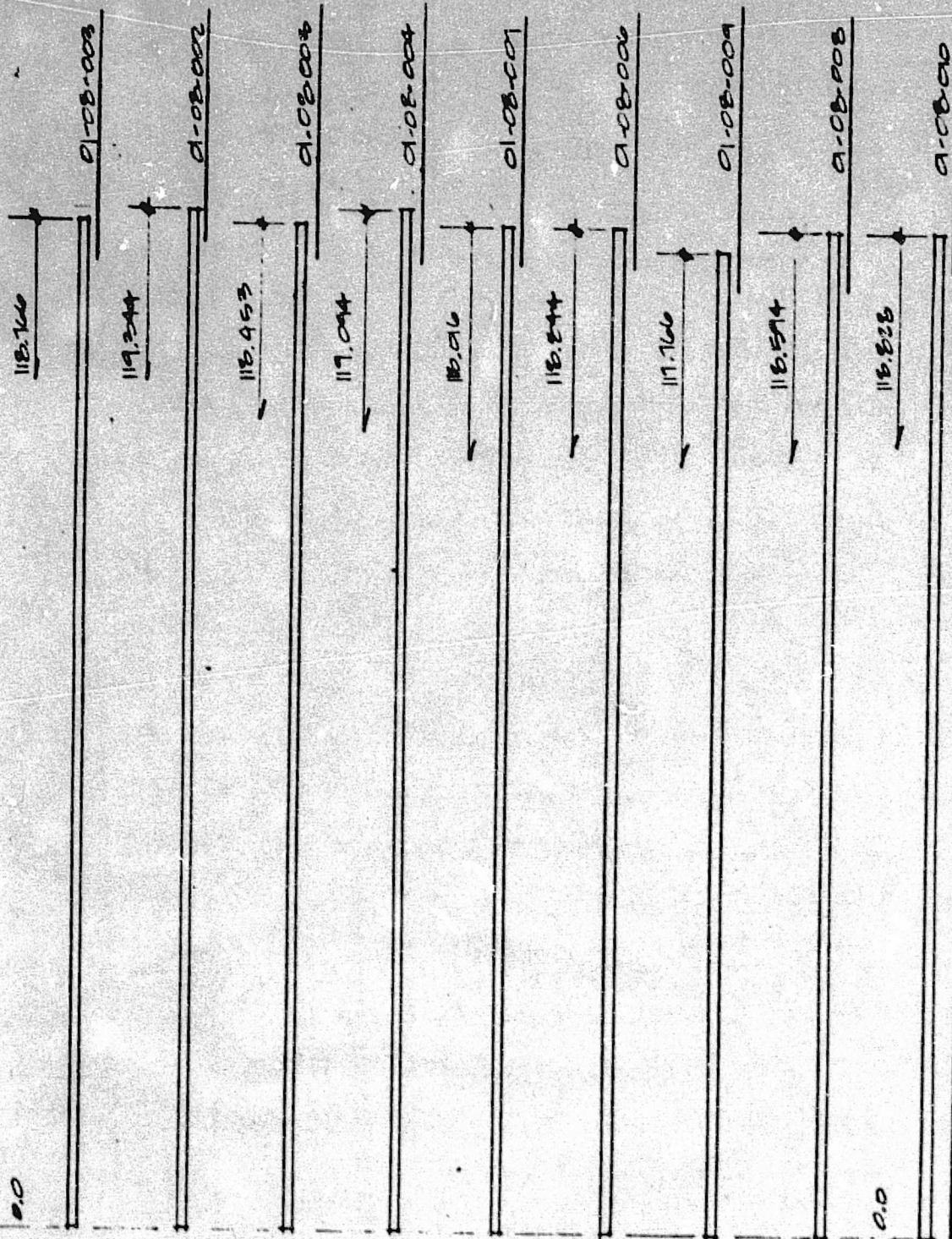
REF 01-03-044 THEN -048
 6 CS. GAW REED (01-01-001)
 ALL BENDS UP 90°
 SHEAR SIZE 3.875 X 7.125



MANIFOLD CONNECTING CLIP

SCALE: 1"=1"
 10 GA. GALV. REQ'D (01-01-001)
 SHEAR SIZE 4 x 3

REVISION			
A	1-30-75	REDRAWN	RDS
B	3-27-75	GEN.	69



COPPER MANIFOLD

REF 01-08-003 TO -006
01-08-004 TO -008

HP M COPPER RECD (01-01-101)

IDENTIFICATION NO.		MANIFOLD DIAMETER		PART #	
	#	3/4	1	1/4	1/2
01-08-002	10	X			
01-08-003	11	X			
01-08-004	12		X		
01-08-005	13		X		
01-08-006	14		X		
01-08-007	15			X	
01-08-008	16			X	
01-08-009	17				X
01-08-010	18				X

NOTE: SHOP TO PLACE IDENTIFICATION NO.
ON EA. END OF MANIFOLD TUBE WITH
BLACK MARKER

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

COPPER
MANIFOLD

01-08-002 TO -010	
DRN RB	CHK
0-28-77	REV

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Mulsina, Texas 75141

LIST OF MATERIALS
01-03-002

DATE 1-20-78

FIELD SUB ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB ASSEMBLY - PART

K PART

SOUTH MANIFOLD
SUPPORT CONNECTION

(19)

REV A 3-27-78/MT. 1 OF 1

PART NO. / REV / DESCRIPTION

01-04-003 SOUTH MANIFOLD SUPPORT FIELD ASSEMBLY

01-03-002 SOUTH MANIFOLD SUPPORT

1	01-00-075	HOUSING WRAPPER, 16 GA. GALV. 11 1/8 X 23 1/2 (1.5)
1	01-00-033	HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (1.43)
1	01-00-034	HOUSING BOTTOM, 16 GA. GALV. 6 X 10 (1.42)
1	01-00-035	POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)
1	01-17-016	BEARING, 1 1/2 I.D. CAST IRON.
4	01-17-066	BOLT, 5/8 DIA. HEX, UNC, ZINC COATED.
4	01-17-065	NUT, 5/8 DIA. HEX, UNC, ZINC COATED.
4	01-17-067	LOCKWASHER, 5/8 DIA. ZINC COATED.
1	01-21-005	GROMMET, RUBBER, ATLANTIC INDIA #2903
22	01-17-008	#8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.
	01-07-006	SUPPORT COLUMN.
2	01-06-036	SUPPORT COLUMN, 16 GA. GALV. 3 1/2 X 15 (3.9)
	01-06-023	STIFFENER 16 GA. 3 X 6 (1.25)
12	01-17-008	#8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.
	01-02-030	SOUTH MANIFOLD FLEX HOSE ASSEMBLY
1	01-09-004	SWIVEL GRATE
1	01-09-016	HOSE, FLEX. 1/2" A-T-2
1	01-04-082	MANIFOLD CONX. FIELD ASSEMBLY
1	01-02-038	MANIFOLD CONX. ASSEMBLY
1	01-09-008	TEE, WROT, I.D. 7/8 X 1 1/2 X 5/8
1	01-09-000	ADAPTER WROT 2 1/8 X 1 1/2 LFF. 15-101 OR EQUIV. (MPT)
1	01-17-123	ROD, BRAZING AS REQ'D. (01-500)

REV A 3-27-78 JHT. | OF |

163

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-004

DATE 1-20-78

SOUTH MANIFOLD
SUPPORT CONNECTION

(21)

REV A 3-27-78 CHT. 1 OF 1

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

PART NO. / REV / DESCRIPTION

01-04-035 SOUTH MANIFOLD SUPPORT FIELD ASSEMBLY

01-03-004 SOUTH MANIFOLD SUPPORT CONNECTION.

01-00-075 HOUSING WRAPPER, 16 GA GALV. 11 1/2 X 23 1/2 (1.5)

01-00-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (.43)

01-00-034 HOUSING BOTTOM, 16 GA. GALV. 6 X 10 (.42)

01-00-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)

01-17-016 BEARING, 1 1/2 IN. I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNC, ZINC COATED,

01-17-065 NUT, 5/8 DIA. HEX, UNC, ZINC COATED,

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED,

01-21-005 GROMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 #3 X 1/2 S.D., S.T., HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-00-036 SUPPORT COLUMN, 16 GA. GALV. 37 1/2 X 15 (3.9)

01-00-023 STIFFENER 16 GA. 3 X 16 (.125)

01-17-008 #3 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-030 SOUTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRA-TEK

01-09-010 HOSE FLEX GRA-TEK

01-04-085 MANIFOLD CONX. FIELD ASSEMBLY

01-02-028 MANIFOLD CONX. ASSEMBLY.

01-09-010 TEE, WROT, I.D. 1/8 X 1/8 X 5/8

01-09-000 ADAPTER, WROT, 5/8 X 1/2, LEE #15101 OR EQUIV. (MPT)

01-17-123 ROD, BRAZING AND RECD (01-500)

INTEGRAL HURKUP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS
01-03-005

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

SOUTH MANIFOLD
SUPPORT CONNECTION

(22)

REV A 3-27-78/HT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-04-088 SOUTH MANIFOLD SUPPORT FIELD ASSEMBLY
01-03-005 SOUTH MANIFOLD SUPPORT CONNECTION.

01-06-075 HOUSING WRAPPER, 16 GA GALV. 11 1/8 X 23 1/2 (1.8)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (.43)

01-06-034 HOUSING BOTTOM, 16 GA. GALV. 6 X 10 (.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GROMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 #8 X 1/2 S.D., S.T., HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA. GALV, 37 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 6 (.125)

01-17-008 #8 X 1/2 S.D., S.T. HEX. SCREW ZINC COATED.

01-02-030 SOUTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRATEK

01-09-016 H.P.F. FLEX GRATEK

01-04-086 MANIFOLD CONX FIELD ASSEMBLY

01-02-038 MANIFOLD CONX ASSEMBLY.

01-09-011 TEE, WROT, I.D. 1 3/8 X 1 1/8 X 5/8

01-09-060 ADAPTER WROT 5/8 X 1 1/2 LEE #1501 OR EQUAL (MP)

01-17-123, ROD, BRAZING AS REQ'D (01-500)

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NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS
01-03-006

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

SOUTH MANIFOLD
SUPPORT CONNECTION

(23)

REV A 3-27-80 HT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-04-008 SOUTH MANIFOLD SUPPORT FIELD ASSEMBLY
01-03-006 SOUTH MANIFOLD SUPPORT CONNECTION

01-06-075 HOUSING WRAPPER, 16 GA GALV. 11 1/8 X 23 1/2 (1.6)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (.43)

01-06-034 HOUSING BOTTOM, 16 GA GALV. 6 X 10 (.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GROMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 #8 X 1/2 S.D., S.T., HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA GALV. 37 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 6 (.125)

01-17-008 #8 X 1/2 S.D., S.T. HEX. SCREW ZINC COATED.

01-02-030 SOUTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRATEK

01-09-011 HOSE FLEX GRATEK

01-04-007 MANIFOLD CONX. FIELD ASSEMBLY.

01-02-008 MANIFOLD CONX. ASSEMBLY

01-09-012 TEE, WROT, I.D. 1 3/8 X 1 3/8 X 5/8

01-09-060 ADAPTER, WROT, 5/8 X 1/2, LEE #15-101 OR EQUIV (MPT)

01-17-123, ROD, BRAZING AS REQ'D (01-500)

INVENTORY

NORTHROP, INCORPORATED 302 Nichols Drive, Mulching, Texas 75141

LIST OF MATERIALS
01-03-023

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

NORTH MANIFOLD
SUPPORT CONNECTION

(28)

REV A 3-27-78/HT. 1 OF 1

PART NO. / REV / DESCRIPTION

01-04-033 NORTH MANIFOLD SUPPORT FIELD ASSEMBLY
01-03-023 NORTH MANIFOLD SUPPORT CONNECTION.

01-06-032 HOUSING WRAPPER, 16 GA GALV. 11 1/8 X 23 1/2 (1.8)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (1.43)

01-06-034 HOUSING BOTTOM, 16 GA GALV. 6 X 10 (1.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GRAMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 # 2 X 1/2 S.D., S.T., HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-026 SUPPORT COLUMN, 16 GA GALV 37 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 6 (.125)

01-06-052 STIFFENER 16 GA. 3 X 6 (-125)

01-17-003 # 2 X 1/2 S.D., S.T. HEX. SCREWS ZINC COATED.

01-02-029 NORTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRA-TEK

01-09-014 HOSE FLEX GRA-TEK

01-04-083 MANIFOLD CONX FIELD ASSEMBLY

01-07-038 MANIFOLD CONX FIELD ASSEMBLY

01-09-008 TEE, WROT, I.D. 1 1/8 X 1 1/8 X 5/8

01-09-009 ADAPTER WROT 5/8 X 1/2 LEE #15-101 OR EQUIV (IPT)

01-03-011 TEE, BLEEDER CONNECTING-TYPE "M"
COPPER 4" X 1/4 O.

01-03-060 BLEEDER VALVE ASSEMBLY

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01-09-005 SCHRAUDER VALVE INSERT

01-09-024 SCHRAUDER VALVE W/ 1/4 FLARE ADAPTER

01-09-019 3/4" O.D. 3" LEE LEE TYPE 3 X 4 1/2

01-17-123 3/4" O.D. 3" LEE LEE TYPE 3 X 4 1/2

01-03-024

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

NORTH MANIFOLD
SUPPORT CONNECTION

(29)

REV A 3-27-78/INT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-04-008 NORTH MANIFOLD SUPPORT FIELD ASSEMBLY

01-03-024 NORTH MANIFOLD SUPPORT CONNECTION.

01-06-033 HOUSING WRAPPER, 16 GA GALV. 11 5/8 X 23 1/2 (1.8)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (1.43)

01-06-034 HOUSING BOTTOM, 16 GA. GALV. 6 X 10 (1.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GRAMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 3/8 X 1/2 S.D., S.T., HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA. GALV. 31 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 6 (1.25)

01-06-052 STIFFENER 16 GA. 3 X 6 (1.25)

01-17-008 3/8 X 1/2 S.D., S.T. HEX. SCREW ZINC COATED.

01-02-029 NORTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SNIVEL GRAFT

01-09-016 FLEX HOSE GRAFT

01-04-084 MANIFOLD CONX. FIELD ASSEMBLY.

01-02-038 MANIFOLD CONX. ASSEMBLY.

01-09-009 TEE, WROT, I.D. 1 1/8 X 1/2 X 5/8

01-09-060 ADAPTER WROT 5/8 X 1/2 LEE #15-19 OR EQUIV (WPT)

01-08-011 TEE, BLEEDER CONNECTING-TYPE "M"
COPPER 4" X 1/4 D.

01-03-000 BLEEDER VALVE ASSEMBLY

01-09-005 SCHRAEDER VALVE INSERT

01-09-024 SCHRAEDER VALVE W/1/4 FLARE ADAPTER

01-16-015 3/16 COPPER LEAD TUBE X 4 1/2"

01-17-123 3/8 DIA. HEX. SCREW 1/2" L. 01-500

ASSEMBLY
FIELD ASSEMBLY

FIELD SUB-ASSEMBLY - PART
K SHOP FINAL ASSEMBLY - PART
K SHOP SUB-ASSEMBLY - PART
K PART

PART. NO. / REV / DESCRIPTION

01-04-088 NORTH MANIFOLD SUPPORT FIELD ASSEMBLY
01-03-025 NORTH MANIFOLD SUPPORT CONNECTION.

1	01-00-032	HOUSING WRAPPER, 16 GA GALV. 11 1/8 X 23 1/2 (1.8)
1	01-06-033	HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (1.43)
1	01-06-034	HOUSING BOTTOM, 16 GA GALV. 6 X 10 (1.42)
1	01-06-035	POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (1)
1	01-17-016	BEARING, 1 1/2 I.D. CAST IRON.
1	01-21-003	GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8
4	01-17-066	BOLT, 5/8 DIA. HEX, UNF, ZINC COATED.
4	01-17-065	NUT, 5/8 DIA. HEX, UNF, ZINC COATED.
4	01-17-067	LOCKWASHER, 5/8 DIA. ZINC COATED.
1	01-21-005	GROMMET. RUBBER, ATLANTIC INDIA #2903
22	01-17-008	#3 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.
1	01-02-006	SUPPORT COLUMN.
1	01-06-036	SUPPORT COLUMN, 16 GA. GALV. 5 1/2 X 15 (3.1)
1	01-06-023	STIFFENER 16 GA. 3 X 6 (1.25)
12	01-06-052	STIFFENER 16 GA. 3 X 6 (1.25)
1	01-17-008	#3 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.
1	01-02-029	NORTH MANIFOLD FLEX HOSE ASSEMBLY
1	01-09-004	SWIVEL GIRA TEK
1	01-09-016	HOSE FLEX, GIRA TEK
1	01-04-085	MANIFOLD CONX. FIELD ASSEMBLY
1	01-02-035	MANIFOLD CONX ASSEMBLY -
1	01-09-010	TEE, WROT, I.D. 1 1/8 X 1 1/8 X 5/8
1	01-09-060	ADAPTER WROT 5/8 X 1 1/2 LEE #13-101 OR EQUIV (MPT)
1	01-03-011	TEE, BLEEDER CONNECTING-TYPE "M" COPPER 4" X 1/4 D.
1	01-03-060	BLEEDER VALVE ASSEMBLY
1	01-09-025	SCHRAEDER VALVE INSERT
1	01-09-024	SCHRAEDER VALVE 1/1/4 FLARE ADAPTER
1	01-03-019	3/16 O.D. COPPER LEAD TUBE X 4 1/2"
1	01-17-123	22 BEARING AS REQ'D. 01-5001

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0-02-020
DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

NORTH MANIFOLD
SUPPORT CONNECTION

(31)

REV A 3-27-78/HT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-04-033 NORTH MANIFOLD SUPPORT FIELD ASSEMBLY

01-03-026 NORTH MANIFOLD SUPPORT CONNECTION

01-06-032 HOUSING WRAPPER, 16 GA GALV. 11 1/8 x 23 1/2 (1.8)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 x 10 (1.43)

01-06-034 HOUSING BOTTOM, 16 GA GALV. 6 x 10 (1.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 x 4 1/2 (1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 x 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GRAMMET. RUBBER, ATLANTIC INDIA #2903

01-17-003 = 2 x 1/2 S.D., S.T., HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA. GALV. 37 1/2 x 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 x 6 (.125)

01-06-052 STIFFENER 16 GA. 3 x 6 (.125)

01-17-008 = 2 x 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-029 NORTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GATE

01-09-016 HOSE FLEX GATE

01-04-086 MANIFOLD CONX FIELD ASSEMBLY

01-02-038 MANIFOLD CONX ASSEMBLY

01-09-011 TEE, WROT, I.D. 1 1/8 x 1 1/8 x 5/8

01-09-065 ADAPTER WROT 5/8 x 1/2 LEE #1510 1/2 x 1/2 x 1/2

01-03-011 TEE, BLEEDER CONNECTING-TYPE "M"
COPPER 4" x 1/4 D.

01-03-060 BLEEDER VALVE ASSEMBLY

01-09-005 SCHRAEDER VALVE INSERT

01-07-024 SCHRAEDER VALVE W/1/4 FLARE ADAPTER

01-07-019 3/16 O.D. COPPER LEAD TUBE x 4 1/2"

01-17-123, 202, BRAZING AS USED. 01-500

INVENTORY

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS
01-03-027

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

NORTH MANIFOLD
SUPPORT CONNECTION

(32)

REV A 3-27-78/MT. 1 OF 1

PART. No. / REV / DESCRIPTION

01-04-088 NORTH MANIFOLD SUPPORT FIELD ASSEMBLY
01-03-027 NORTH MANIFOLD SUPPORT CONNECTION.

01-06-033 HOUSING WRAPPER, 16 GA GALV. 11 1/8 X 23 1/2 (1.8)

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01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (.43)

01-06-034 HOUSING BOTTOM, 16 GA GALV. 6 X 10 (.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GROMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 3/8 X 1 1/2 S.D. S.T. HEX SCREW ZINC COATED

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA GALV. 37 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 6 (.125)

01-06-052 STIFFENER 16 GA. 3 X 6 (.125)

01-17-008 3/8 X 1 1/2 S.D. S.T. HEX SCREW ZINC COATED.

01-02-029 NORTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRATEK

01-09-016 HOSE FLEX, GRA-TEK

01-04-087 MANIFOLD CONX. FIELD ASSEMBLY.

01-02-038 MANIFOLD CONX. FIELD ASSEMBLY.

01-09-012 TEE, WROT, I.D. 1 3/8 X 1 3/8 X 5/8

01-09-060 ADAPTER, WROT, 3/8 X 1/2 LEE #15-1015 EIGHT (WPT)

01-08-011 TEE, BLEEDER CONNECTING-TYPE M
COPPER 4" X 1/4 D.

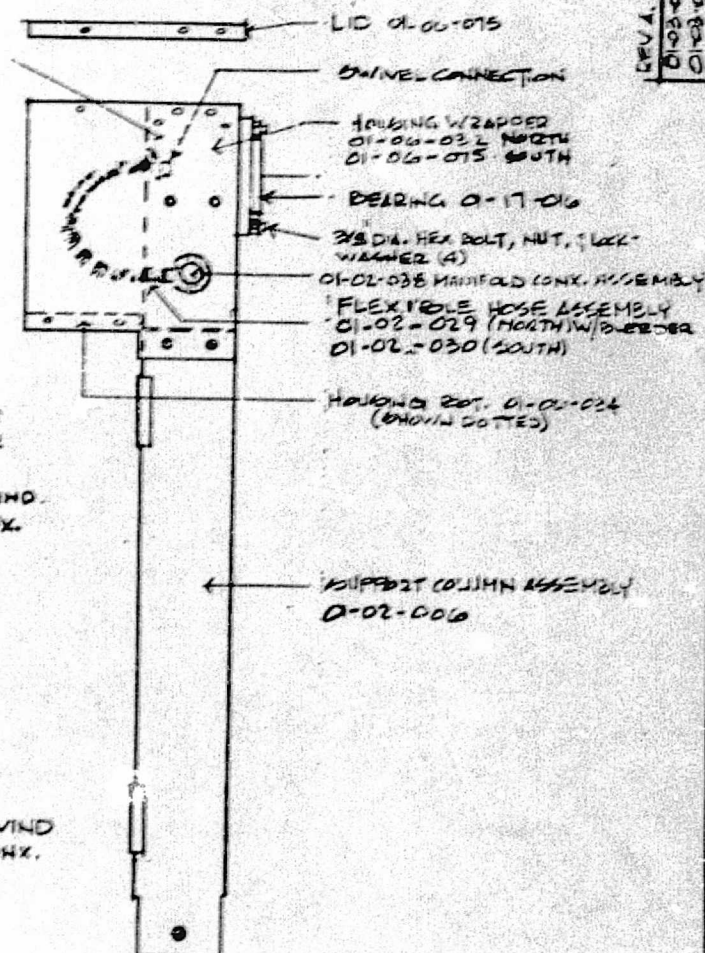
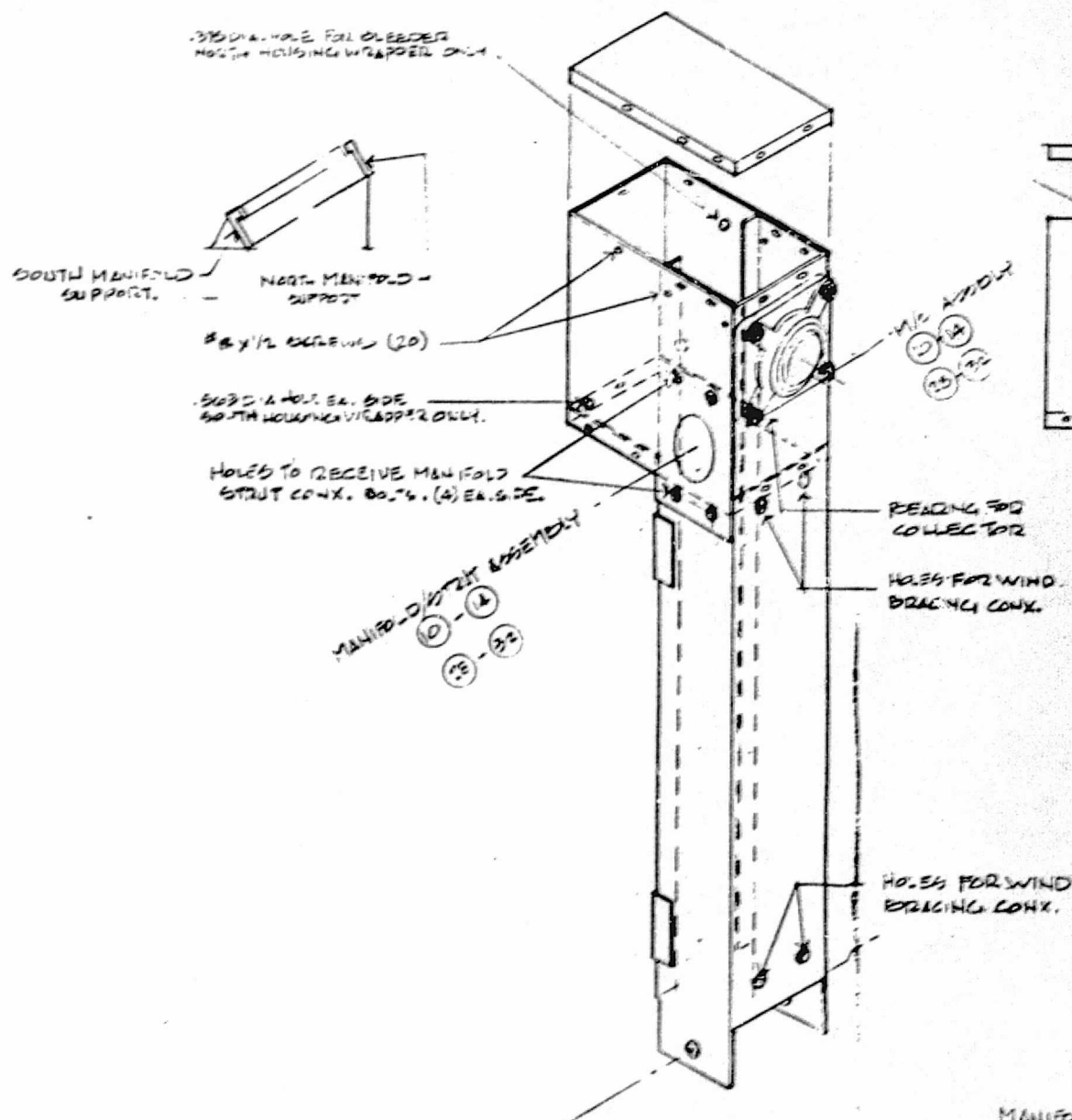
01-03-060 BLEEDER VALVE ASSEMBLY

01-09-005 SCHROEDER VALVE INSERT

01-09-004 SCHROEDER VALVE 1/4" F.A.R. ADAPTER.

01-03-019 3/16 O.D. LEAD TUBE 2' L.

01-17-123 3/8 X 1 1/2 S.D. S.T. HEX SCREW ZINC COATED



MANIFOLD/STUT ASSEMBLY - DETERMINE THE SIZE. SEE 0-05-01

01-03-002
THRU
01-03-005
01-03-003
THRU

REV. A. 280444-2310	01-03-002 THRU
01-03-005	01-03-003 THRU
01-03-007	01-03-007
01-03-008	01-03-008
01-03-009	01-03-009
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01-03-100	01-03-100

MANIFOLD/STUT ASSEMBLY

(17) THRU (32)

MANIFOLD/STUT ASSEMBLY

MANIFOLD/STUT ASSEMBLY

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.12" ASSEMBLY
LENGTH

(01-09-016)

GRATEK - FLEX HOSE

- ① -40° TO +335° F
150 PSI MAX. WORK PRESSURE
- ② DACRON GLASS OUTER BRAID,
GLASS INNER BRAID.
- ③ ETHYLENE PROPYLENE CORE.
-40° TO -220° F

(01-17-129)
STEEL CLIP
RETAINER

(01-02-029)
NORTH END (ONLY)
HOSE ASSEMBLY
TO HAVE 1/4" Ø X 1"
CU. TUBE FOR BLEEDER
ASSEMBLY CONX.
(01-08-011)

(01-09-004)
GRA-TEK SWIVEL

(01-21-021) VITON "O" RING.

NO. 1 - 01-02-030

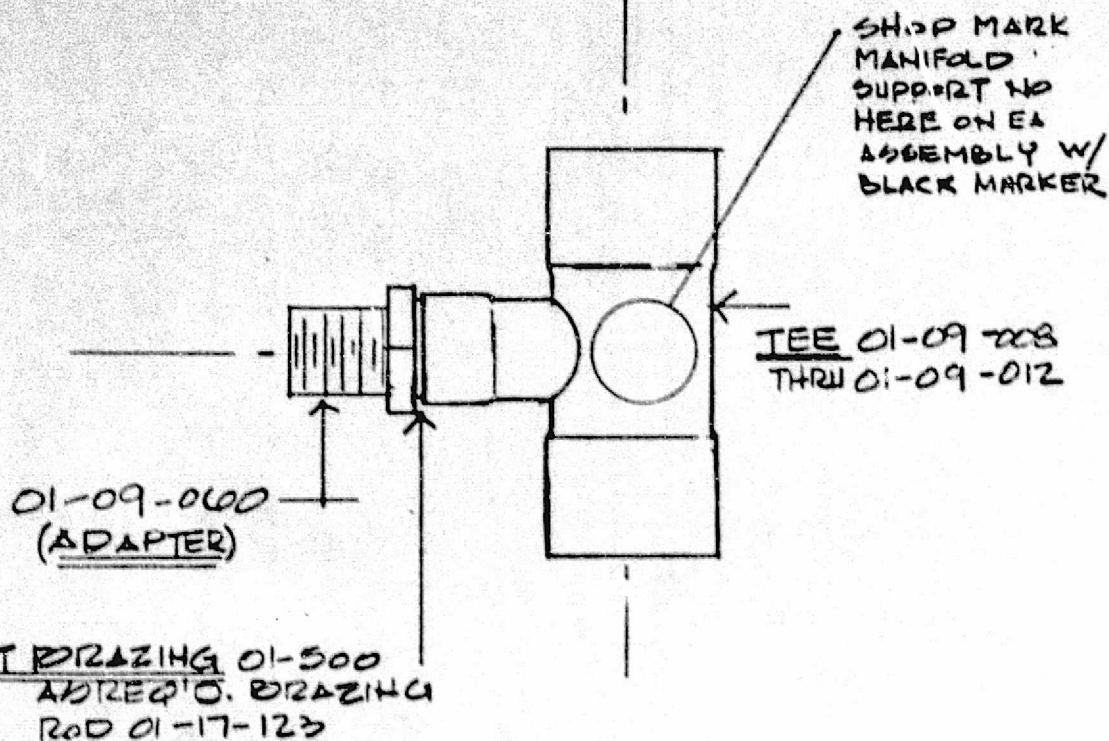
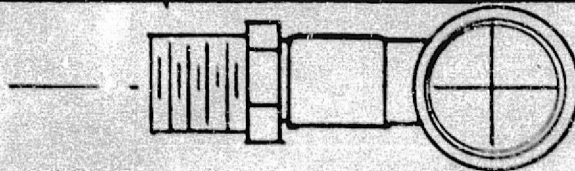
NORTHROP

NORTHROP, INCORPORATED 302 N. 10th St. Dallas, Texas 75241

SWIVEL
(FLEX HOSE)
ASSEMBLY

01-02-029
REV
5-55

QTY	TEE PART NO	NUMBER	TEE SIZE	ADAPTER PART NO
2	01-09-008	19	3/4 X 3/4	01-09-000
1	01-09-009	20	1 X 3/4	
1	01-09-010	21	1 X 1	
1	01-09-011	22	1 1/4 X 1	
2	01-09-012	23	1 1/4 X 1 1/4	
2	01-09-008	28	3/4 X 3/4	
1	01-09-009	29	1 X 3/4	
1	01-09-010	30	1 X 1	
1	01-09-011	31	1 1/4 X 1	
2	01-09-012	32	1 1/4 X 1 1/4	01-09-000



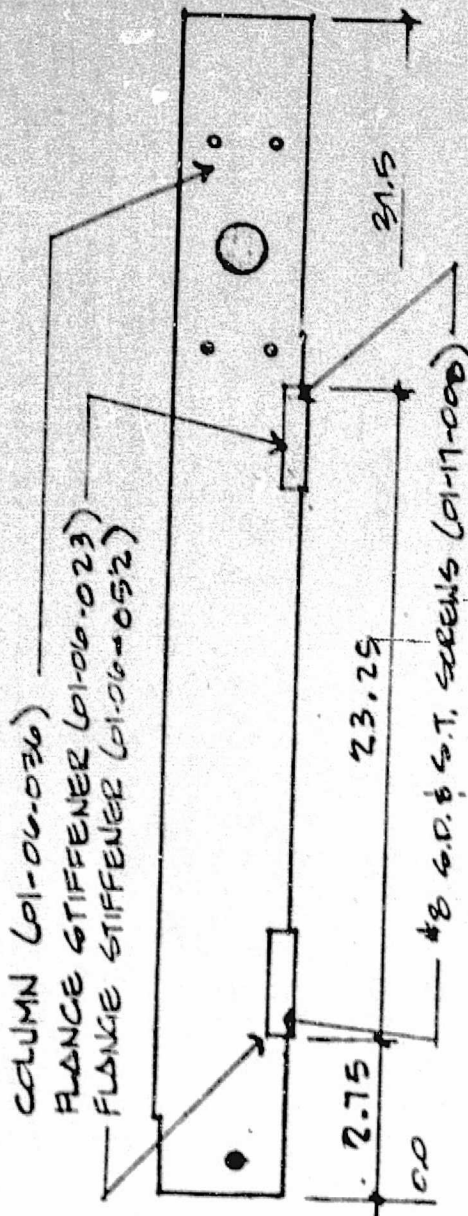
JOINTHORUP

HRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

MANIFOLD CONX.
ASSEMBLY

0-02-038
DIN 69 OK
3-1-75 REV

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MANIFOLD SUPPORT COLUMN - FINAL SHOP DSKY
REF. 01-02-002 THEN 010 & 01-03-022 THEN 021

BILL OF MATERIALS PER ASSEMBLY		
QTY	PART #	DESCRIPTION
1	01-06-036	COLUMN
1	01-06-023	FLANGE STIFFENER
1	01-06-052	" " W/ WIND BRG CONNECTN
12	01-17-008	#8 S.D. & S.T. SCREWS

A- REPOSITION FLANGE STIFFENER (01-06-023) - RDS
D- RDC

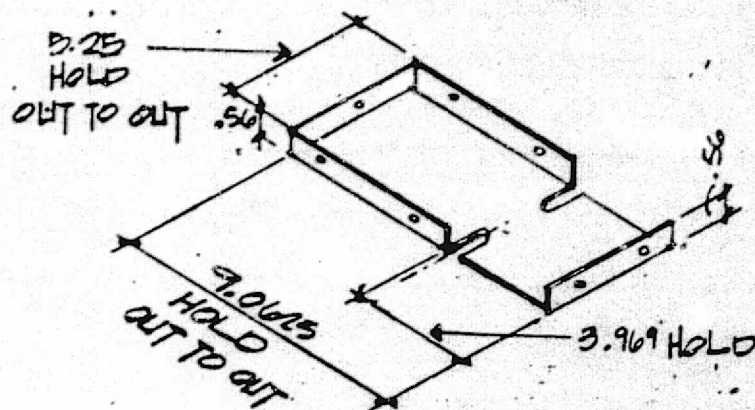
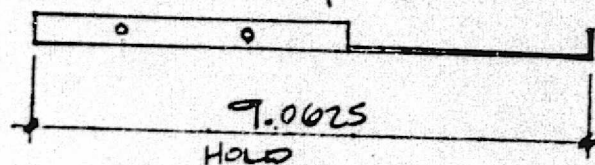
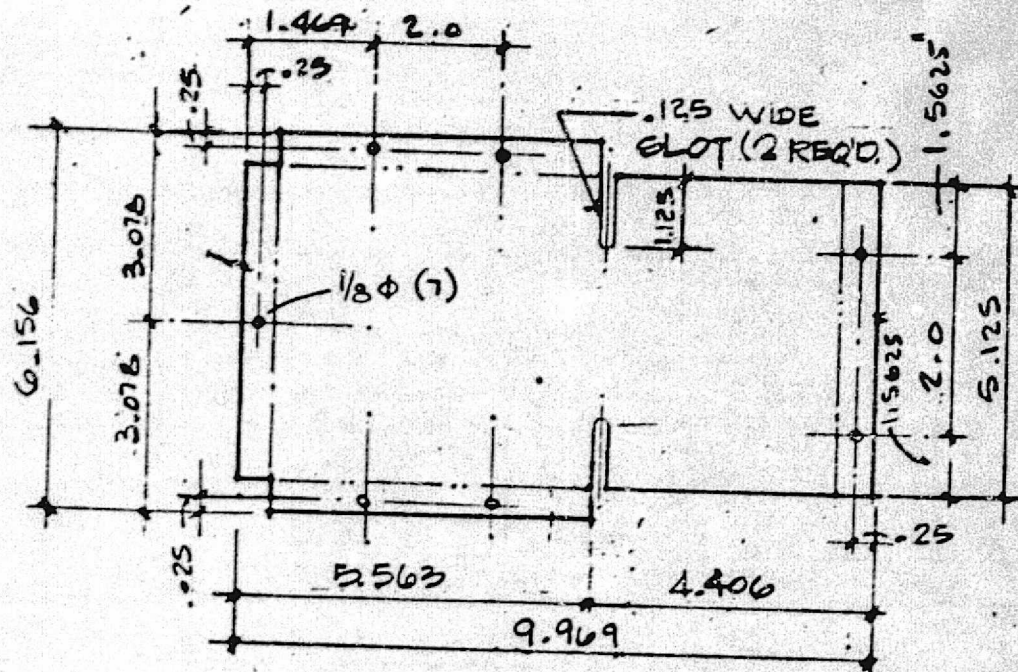
NORTHROP
NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

MANIFOLD SUPPORT
COL. - SHOP DSKY

01-02-006		
DRN	RB	CHK
1-2-71	REV	A

MANIFOLD DRAINAGE HOUSING BOTTOM

CH-06-034	DRN	Rb	CHK
			REV

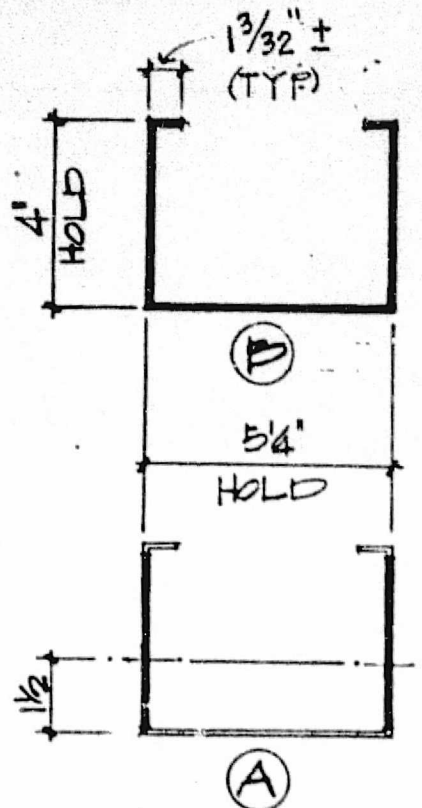
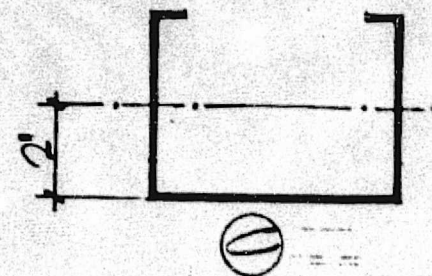


MANIFOLD/CONNECT HOUSING BOTTOM

10 GA. GALV. REQ'D (01-01-001)
BENDS UP 90°
GEAR SIZE 60X 9.0625

REVISIONS			
A	GEN. REVISION	2-10-78	RDS
B	GEN. REVISION	3-24-78	bg
C	GEN. REVISION	4-12-78	bg

1000



MANIFOLD SUPPORT COLUMN

REVISIONS			
A	REDRAWN	ROG	2-15-78
B	REDRAWN	bg	3-21-78
C	DIM. CHG.	bg	4-14-78

MANIFOLD
SUPPORT COLUMN

01-26-026

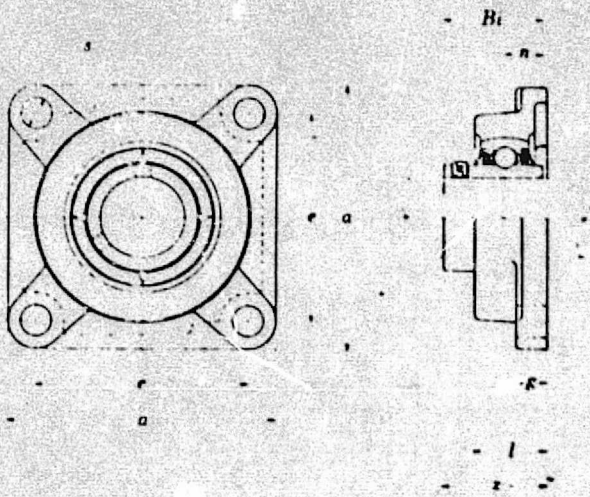
DRN <i>RL</i>	CHK <i>FW</i>
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11-3-77	REV A
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Flanged Units Cast Housing (Four Bolt)

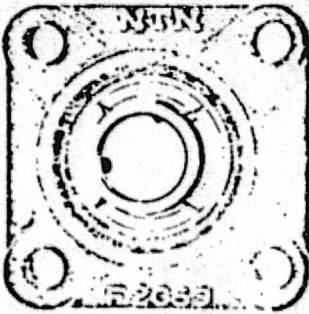
UCF2

Set Screw Type
Normal Duty



Shaft Dia. in.	Complete Flanged Unit Number	Nominal Dimensions in.								Bearing Number	Basic Load Rating lbs.		Housing Number
		\$a\$	\$e\$	\$f\$	\$l\$	\$s\$	\$z\$	\$B_i\$	\$n\$		Dyn. C	Static Co	
1 1/2	UCF 208-1 1/2	5 1/8	4	3/4	1 3/8	.63	2.02	1.937	.748	UC 208-1 1/2	5050	3500	F 208

Flanged Units Cast Housing (Four Bolt)



Set Screw

UCF 2 (for light load)

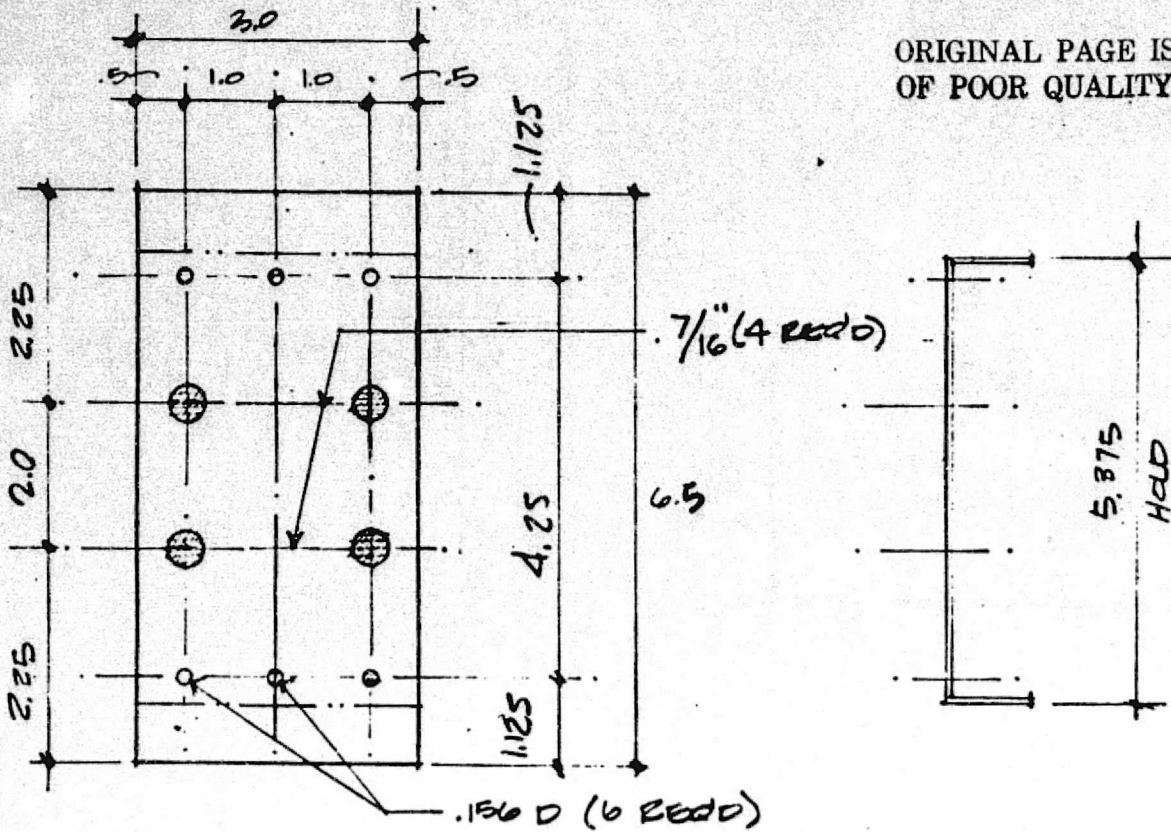
The housing is square and can be conveniently secured to, for instance, the side wall of a machine with 4 bolts. Simple in bearing construction and easy to mount, this is the most widely used of all types of units-with-flange.

THRU, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

NORTH & SOUTH
MANIFOLD SUPPORT
BEARING

01-17-016
DRN 09 CHK
425-73 REV

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FLANGE STIFFENER

16 GA. GALV R200 (A-01-001)

SHEAR SIZE 6.5 X 3 (-135 F32)

ALL BENDS 90°

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

FLANGE STIFFENER
W/ CONNECTION TO
WIND BRACING

01-06-CE2

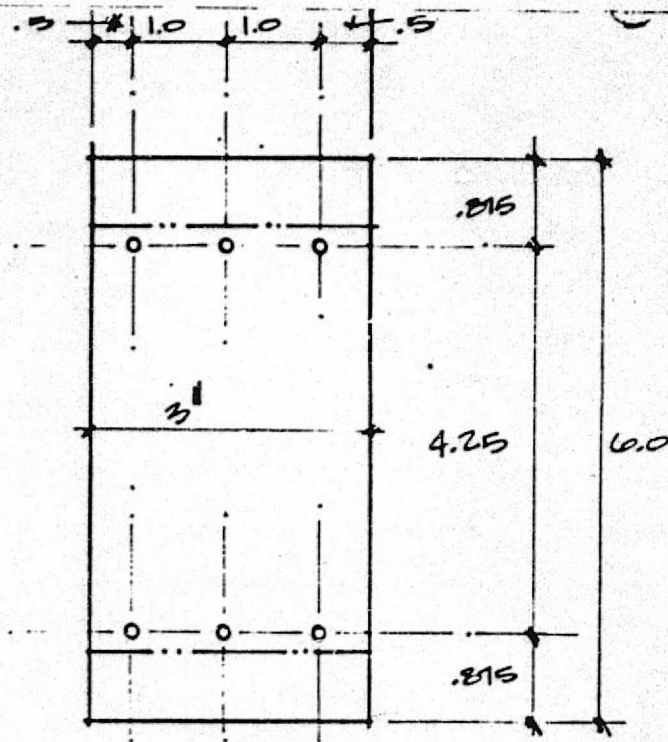
DRN Rb CHK

11/2/77 REV

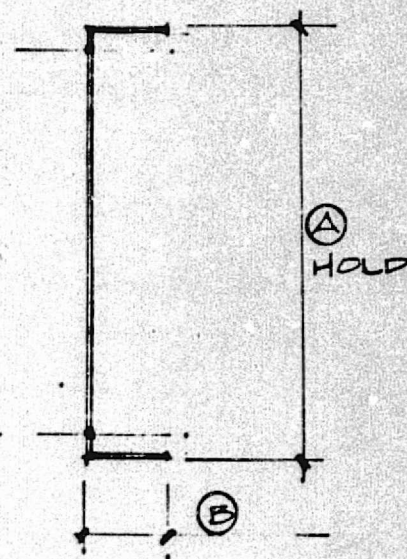
NORTHROP

180

FLANGE
STIFFENER



ALL HOLES .156 Ø (6 REQ'D)



P/N	DESCRIPTION	(A)	(B)
01-06-001	FOR 5.0 IN. WIDTH	5.125	.548 ±
01-06-002	5.125	5.25	.485 ±
01-06-003	5.25	5.315	.423 ±

NOTE: TOLERANCE PER DIMENSION

(A) = $\begin{matrix} +.004 \\ -.0 \end{matrix}$

FLANGE STIFFENERS

1/8 GA. GALV. REQ'D. (01-01-001)

SHEAR SIZE 12X20.0 (30 PER BLANK)

ALL BENDS 90°

TAPE C7

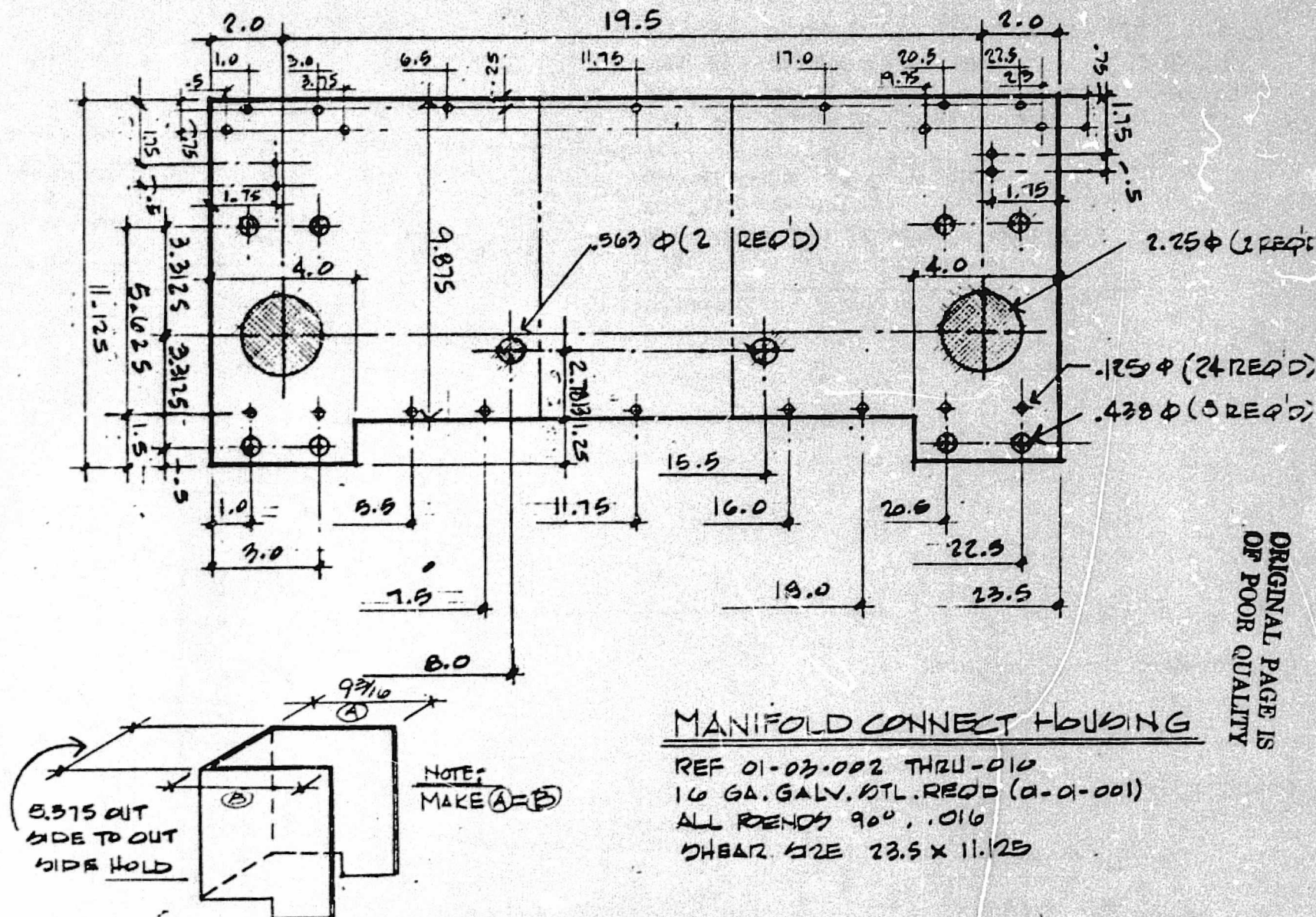
01-06-010	DRN	REV
	PB	CRK
		REV

NORTHROP

SOUTH MANIFOLD CONNECT HOUSING

01-00-075	CHK
1-13-78	REV

181



MANIFOLD CONNECT HOUSING

REF 01-03-002 THRU-010
16 GA. GALV. STL. REQ'D (0-01-001)
ALL RENDS 90°, .016
DHBAR SIZE 23.5 X 11.125

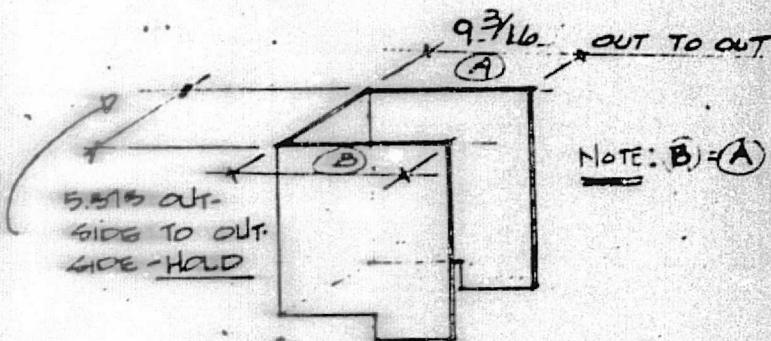
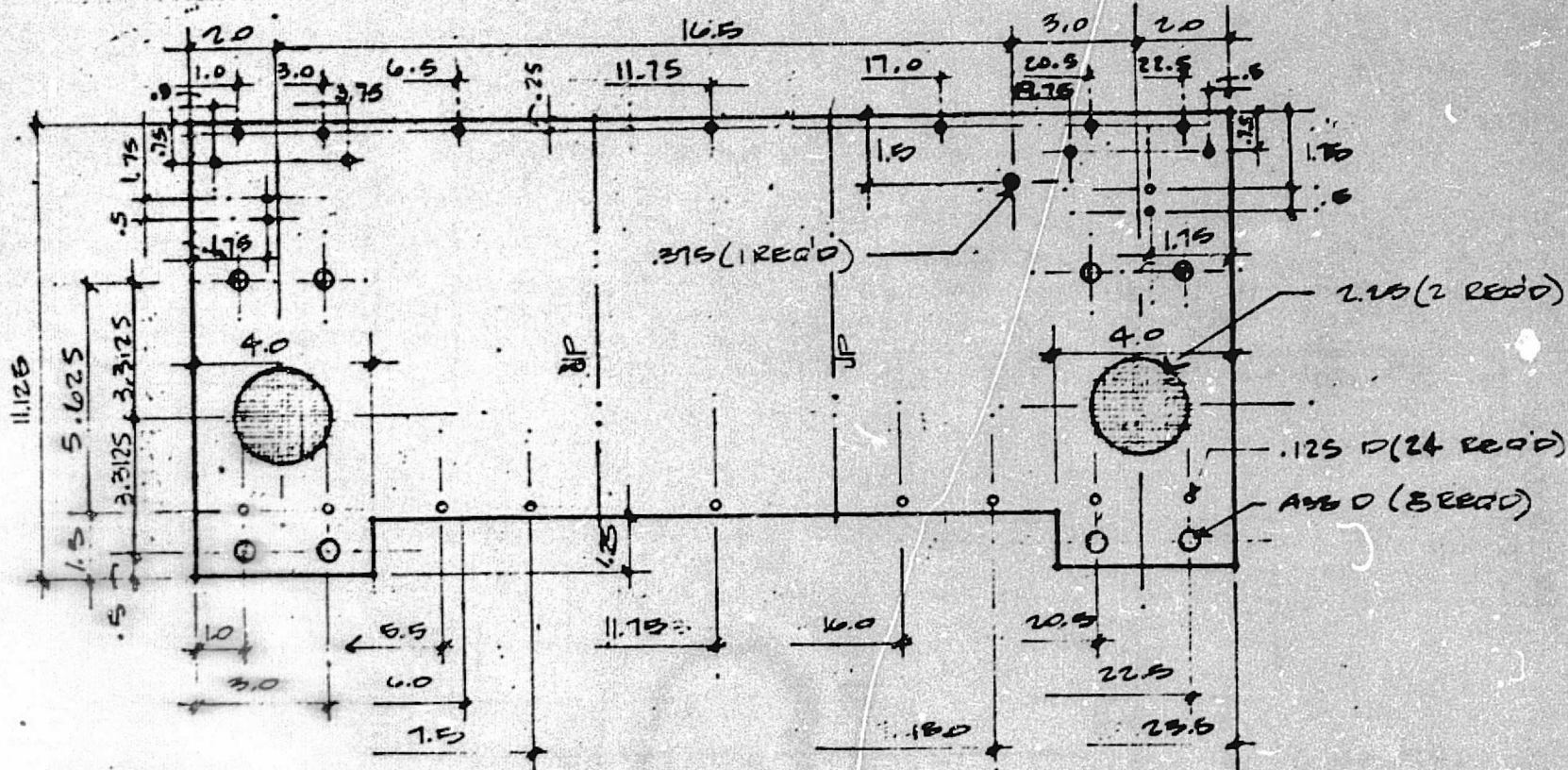
REV. A., ADDED 1/8 DIA. HOLES 3-24-78 BQ.

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JOHN HOPKINS

NORTH MAIN FOLD
CONJECT Hocking

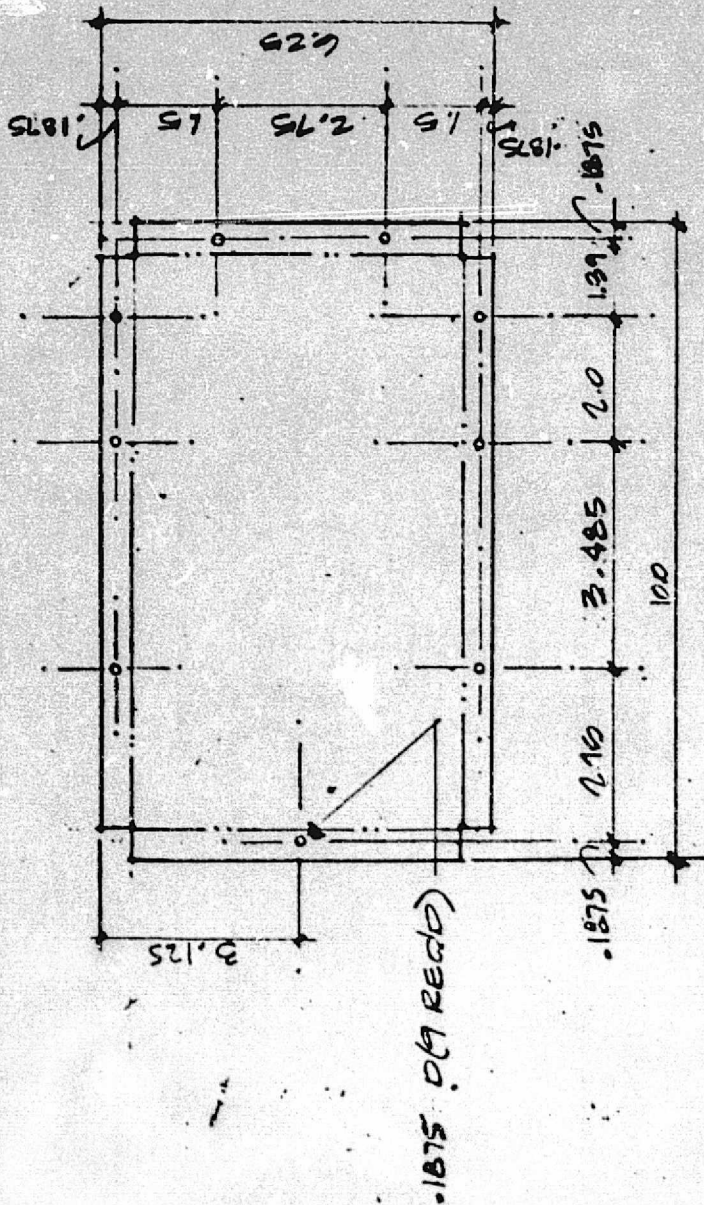
01-06-2021	CHK	-
DRN	Ed	REV
10/2/2021	77	-



REF. 9-02-023 THEN -031.
KODAKE CALV. REC'D (41-01-001)
ALL BENDS 90°
SHEAR SIZE 23.6 X 11.125

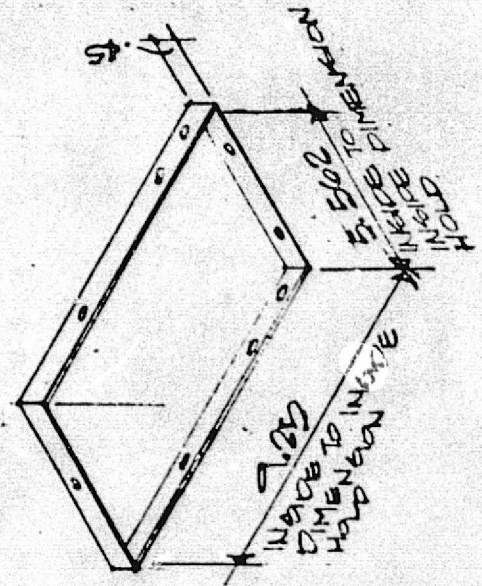
- REV A - MANIFOLD (2 1/4) HOLES 11/3/77 RB
REV B - SPEC'D NORTH MANIFOLD 11/15/77 WR.
REV C - BLANK SIZE REV. 2-10-78 RDS
REV. D - ADDED 1/8 DIA. HOLES 3-24-78 BG

ORIGINAL PAGE IS
OF POOR QUALITY

Hollingsworth
D17

REF. 01-03-002 THRU -010
10 CA. CALV. REG'D. (01-01-001)
ALL BENDS UP 90°
STEAK EYE 10.0 x 6.25
EGG 800 ALL CORNERS

REV. A - INSIDE DIMS. REV. 2-10-78 RDS



NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

HAIRING LID

01-06-033

DRN	EB	CHK--
-----	----	-------

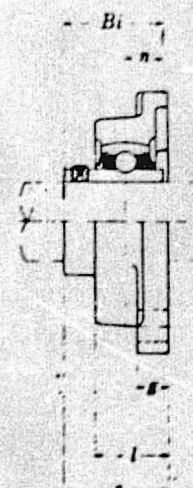
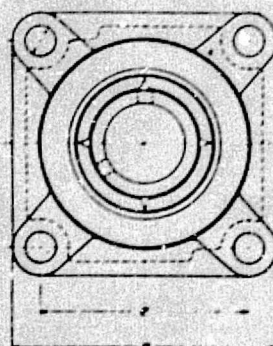
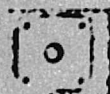
10-21-77 REV A

Flanged Units Cast Housing (Four Bolt)

UCF2

Set Screw Type

Normal Duty



Shaft Dia. in.	Complete Flanged Unit Number	Nominal Dimensions in.									Bearing Number	Basic Load Rating lbs.		Housing Number
		a	c	g	l	s	z	Bi	n	Dyn. C		Static Co		
1/8	UCF 201- 1/8	3 3/8	2 1/8	1/4	1	.47	1.31	1.220	.500	UC 201- 1/8	2220	1390	F 204	
1/8	UCF 202- 1/8	3 3/8	2 1/8	1/4	1	.47	1.31	1.220	.500	UC 202- 1/8	2220	1390	F 204	
1/8	UCF 202- 1/8	3 3/8	2 1/8	1/4	1	.47	1.31	1.220	.500	UC 202- 1/8	2220	1390	F 204	
1/8	UCF 203- 1/8	3 3/8	2 1/8	1/4	1	.47	1.31	1.220	.500	UC 203- 1/8	2220	1390	F 204	
1/8	UCF 204- 1/8	3 3/8	2 1/8	1/4	1	.47	1.31	1.220	.500	UC 204- 1/8	2220	1390	F 204	
1 1/8	UCF 205- 1 1/8	3 3/8	2 1/8	1/4	1 1/8	.47	1.41	1.339	.563	UC 205- 1 1/8	2430	1560	F 205	
1 1/8	UCF 205- 1 1/8	3 3/8	2 1/8	1/4	1 1/8	.47	1.41	1.339	.563	UC 205- 1 1/8	2430	1560	F 205	
1 1/8	UCF 205- 1 1/8	3 3/8	2 1/8	1/4	1 1/8	.47	1.41	1.339	.563	UC 205- 1 1/8	2430	1560	F 205	
1 1/8	UCF 205- 1 1/8	3 3/8	2 1/8	1/4	1 1/8	.47	1.41	1.339	.563	UC 205- 1 1/8	2430	1560	F 205	
1 1/8	UCF 206- 1 1/8	4 1/8	3 3/8	1/4	1 1/8	.47	1.58	1.500	.626	UC 206- 1 1/8	3350	2250	F 206	
1 1/8	UCF 206- 1 1/8	4 1/8	3 3/8	1/4	1 1/8	.47	1.58	1.500	.626	UC 206- 1 1/8	3350	2250	F 206	
1 1/8	UCF 206- 1 1/8	4 1/8	3 3/8	1/4	1 1/8	.47	1.58	1.500	.626	UC 206- 1 1/8	3350	2250	F 206	
1 1/8	UCF 206- 1 1/8	4 1/8	3 3/8	1/4	1 1/8	.47	1.58	1.500	.626	UC 206- 1 1/8	3350	2250	F 206	
1 1/8	UCF 207- 1 1/8	4 1/8	3 3/8	1/4	1 1/8	.55	1.75	1.689	.689	UC 207- 1 1/8	4450	3050	F 207	
1 1/8	UCF 207- 1 1/8	4 1/8	3 3/8	1/4	1 1/8	.55	1.75	1.689	.689	UC 207- 1 1/8	4450	3050	F 207	
1 1/8	UCF 207- 1 1/8	4 1/8	3 3/8	1/4	1 1/8	.55	1.75	1.689	.689	UC 207- 1 1/8	4450	3050	F 207	
1 1/8	UCF 207- 1 1/8	4 1/8	3 3/8	1/4	1 1/8	.55	1.75	1.689	.689	UC 207- 1 1/8	4450	3050	F 207	
1 1/8	UCF 208- 1 1/8	5 1/8	4 1/8	1/4	1 1/8	.63	2.02	1.937	.748	UC 208- 1 1/8	5050	3500	F 208	
1 1/8	UCF 208- 1 1/8	5 1/8	4 1/8	1/4	1 1/8	.63	2.02	1.937	.748	UC 208- 1 1/8	5050	3500	F 208	

BEARING/HOUSING UNIT

REFER 01-03-002 THRU 01-03-010
FROM NTN CATALOG # 2596

01-17-06
DN P6 CR
2-17-77 R.V.

BEARING UNIT AT
MANIFOLD CONNECTION

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

MECHANICAL

F. Solar System

1. GENERAL:

This Section valid only when considered in total with other Contract Documents. Cross references are for convenience of reader and their inclusion in or omission from any particular Section in no way limits scope of particular Section or intent of any Contract Document.

2. WORK SPECIFIED HEREIN:

- A. Complete installed solar collection system as shown on the drawings.
- B. Erection, and connection of solar collectors and collector support systems.

3. RELATED WORK:

Specified in other Sections:

- A. Electrical power wiring and conduit (in Electrical Division).

4. MATERIALS & EQUIPMENT:

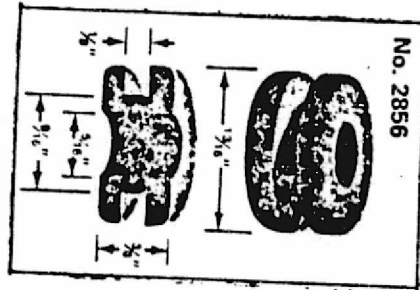
A. Solar Collectors and Structural Supports:

1. Solar Collectors:

Each collector consists of fresnel lens (12" wide x 116 1/2" net aperture), insulated housing, selective coated copper absorber tube with hollow end shafts and 1/4" MPT connections through each shaft to the absorber tube. Components of each collector consist of the following:

- a. Factory assembled housing, interior insulation, end (north and south) 1 1/4" O.D. hollow shafts, absorber tube, 1/4" absorber tube connections through end of each shaft,

C-3

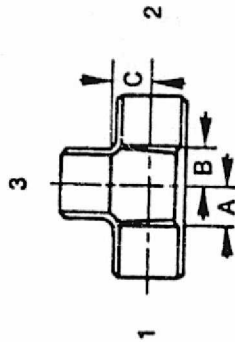


CROMET - WIRE
 REF # 01-02002
 # 01-020052
 FROM ATLANTIC INDIA RUBBER
 COMPANY CATALOG

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NORTHROP NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141	CROMET-WIRE		01-21-001	
	TRACKING MECHANISM		RB	216
			12-7-77	

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PART #	SIZE / OD.	Qty #	MUELLER PART #
01-09-008	1 1/8 x 1 1/8 x 5/8	01-03-002	W-4033
01-09-009	1 1/8 x 1 1/8 x 5/8	01-03-003	W-4058
01-09-010	1 1/8 x 1 1/8 x 5/8	01-03-004	W-4051
01-09-011	1 3/8 x 1 1/8 x 5/8	01-03-005	W-4076
01-09-012	1 3/8 x 1 3/8 x 5/8	01-03-006	W-4071
01-09-013	1 3/8 x 1 3/8 x 5/8	01-03-007	W-4094
01-09-014	1 3/8 x 1 3/8 x 5/8	01-03-008	W-4088
01-09-015	2 1/8 x 1 3/8 x 5/8	01-03-009	W-4014
01-09-023	2 1/8 x 2 1/8 x 5/8	01-03-010	W-40107

MANIFOLD CONNECTING TEE

REF. 01-03-002 THRU 01-03-010 & 01-03-023(03)
FROM STREAMLINE PRODUCTS CO. # E-175

ALL FITTINGS CONFORM TO ANSI B16.22
STANDARDS.

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

MANIFOLD
CONNECTING TEE

01-09-008
thru
01-09-015
AND
01-09-023

DRN	RB	CHK
10-28-77		REV

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Mulching, Texas 75141

01-03-060

DATE 1-10-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

BLEEDER VALVE ASSEMBLY

REV

QNT. 1 of 1

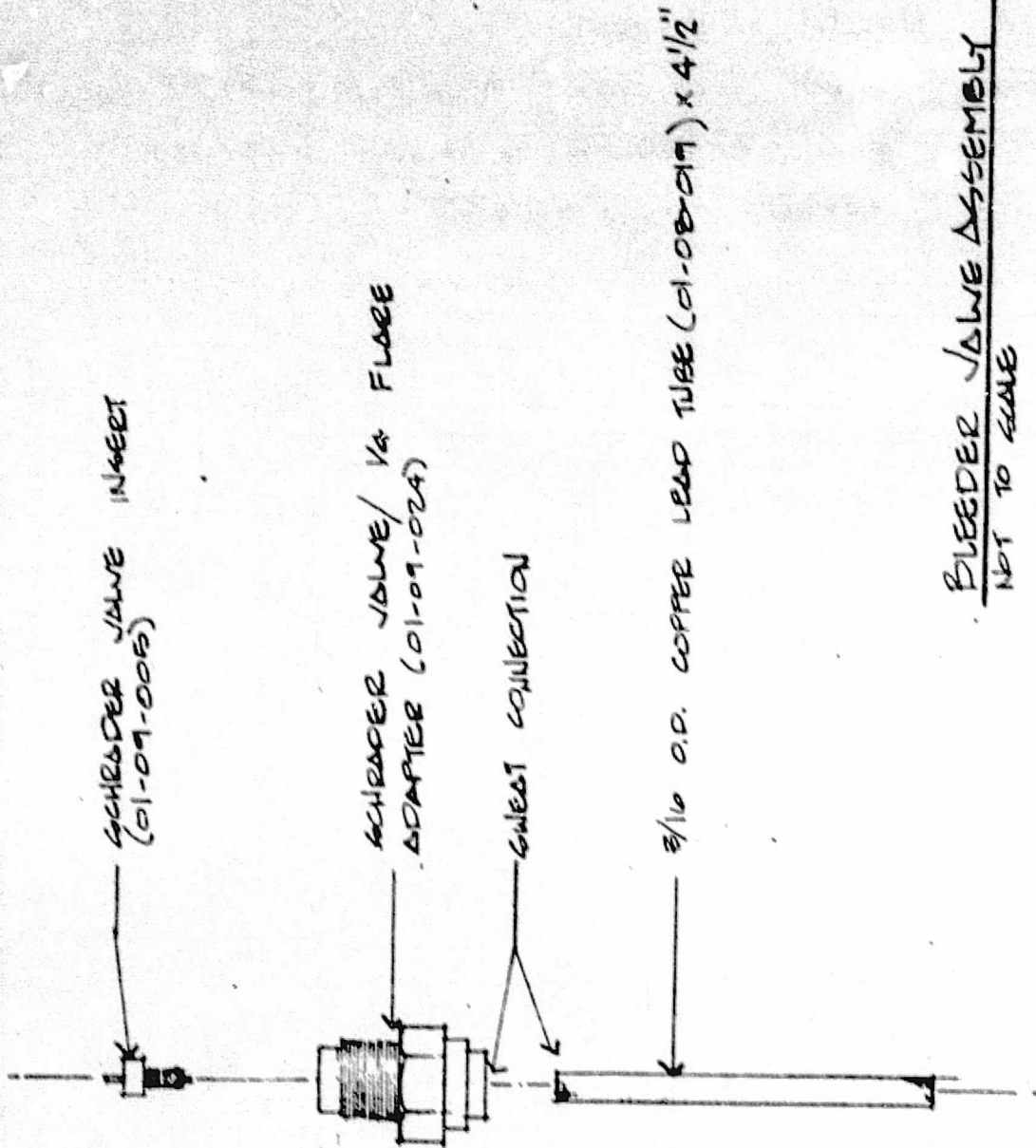
PART. NO. / REV / DESCRIPTION

01-03-060 BLEEDER VALVE ASSEMBLY

01-09-003 BLEEDER VALVE INSERT

01-09-004 BLEEDER VALVE / 1/4 FLARE ADAPTER

01-08-019 LEAD TUBE, 3/16 OD, ^{x4 1/2"} COPPER, TYPE "L", SOFT DRAW (00-CL-135)



BLEEDER VALVE ASSEMBLY
NOT TO SCALE

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

BLEEDER VALVE
ASSEMBLY

01-03-060		
DRN	RB	CHK
1-10-78		REV

01-03-050

DATE 1-31-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

NORTH WIND STRUT

REV

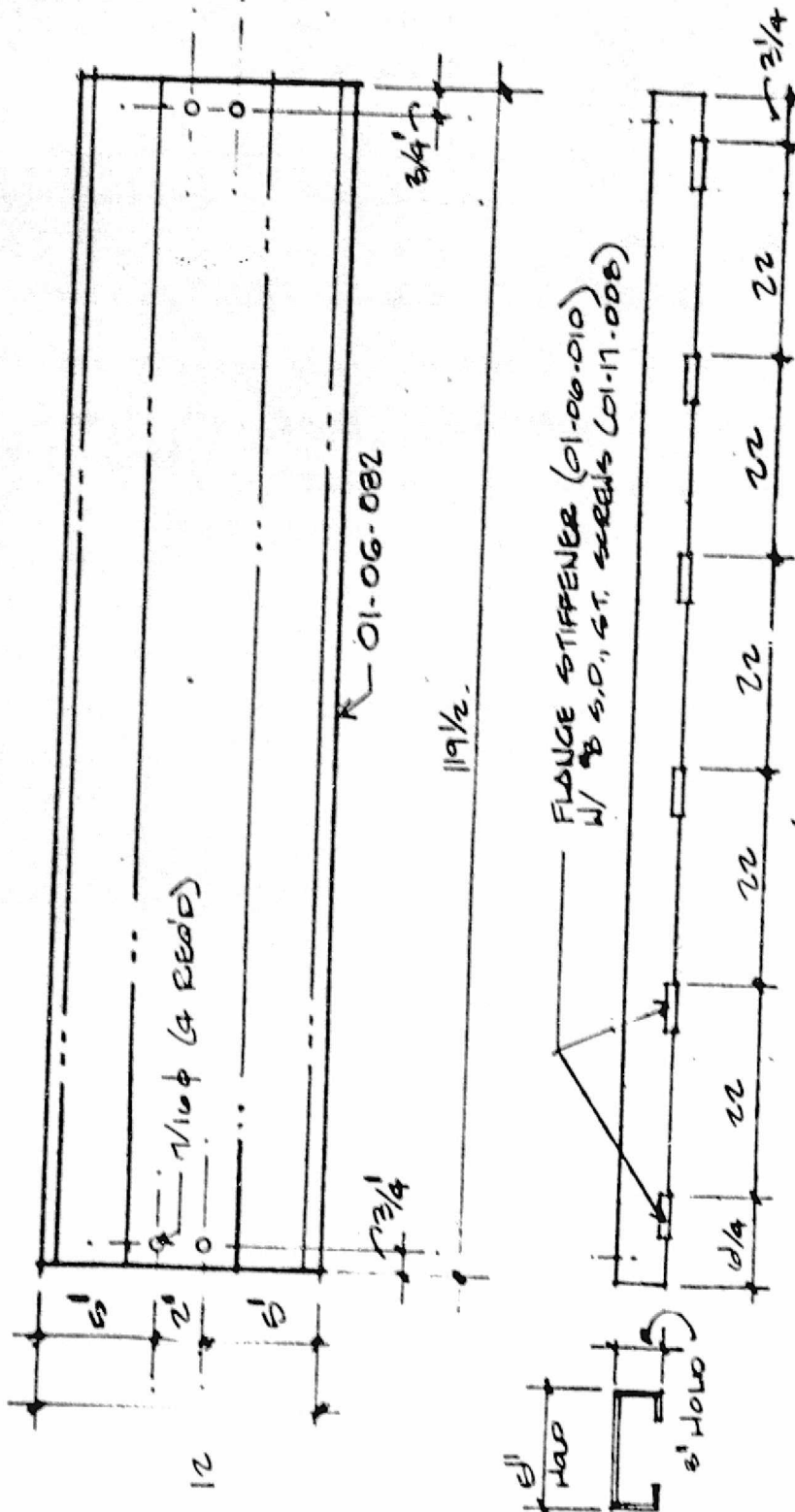
SHT. 1 of 1

PART. NO. / REV / DESCRIPTION

01-03-050 NORTH WIND STRUT

1	01-06-082	STRUT, 16 GA. GALV, 19 1/2 x 12, (9.96 #) SEE 01-03-050
6	01-06-010	FLANGE STIFFENER, 16 GA. GALV, 6 x 3 (.125 #)
36	01-11-008	SCREWS #8 x 1/2 S.D. EST.

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NORTH WIND STREET
NOT TO SCALE
10' CB, CALV. (01-01-001)
CLEARANCE 12' 11 1/2"

MACHINE BLANK
01-06-082

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

NORTH WIND STREET

01-06-082

01-06-082

DRN RB CHR

1-31-78 REV

INVENTORY

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-082

DATE 1-10-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

NORTH COL
ASSEMBLY



REV

QNT. 1 of 1

PART. NO. / REV / DESCRIPTION

01-03-082 NORTH COL

1	01-06-085	NORTH COL, 16 GA. GALV., 12x80 ³ / ₄ (6.73 FT ²)
3	01-06-010	FLANGE STIFFENER 16 GA. GALV., 3x6 (.125)
1	01-06-011	FLANGE STIFFENER W/ BASE C, 16 GA. GALV., 5x6 (.21 FT ²)
24	01-11-008	SCREWS #8x1/2 S.D. & S.T.

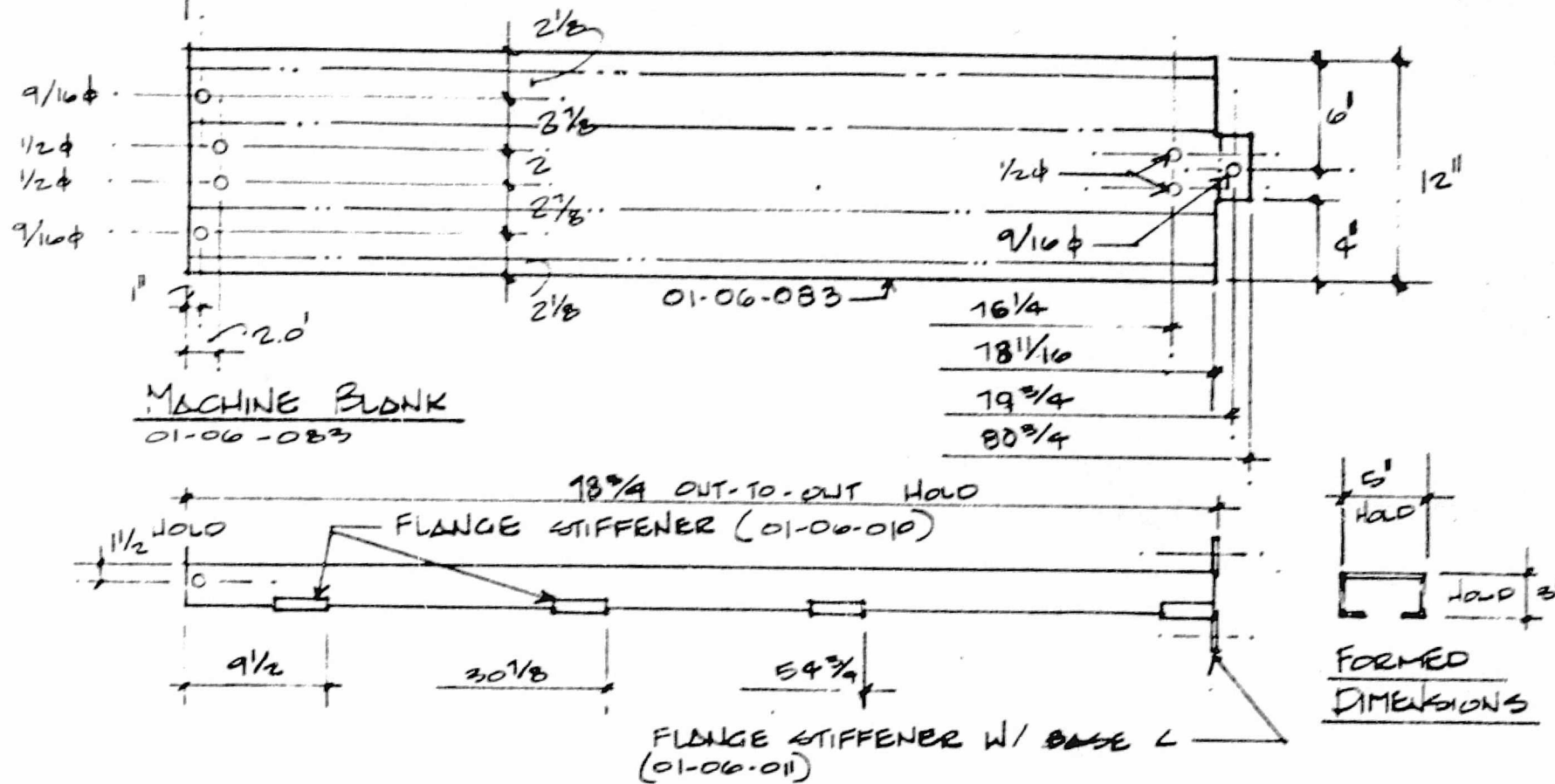
NORTHERN

193

NO. 101 CATHY
ASSEMBLY
2007.1.1 (A)

01-03-032	
DRN	CHK
	121

01-01-085



NORTH COLUMN (A) (32°)

NOT TO SCALE

16 GA. GALV. PRED (01-01-001)
SHEAR SIZE 30 3/4" x 12" (6.73 FT²)

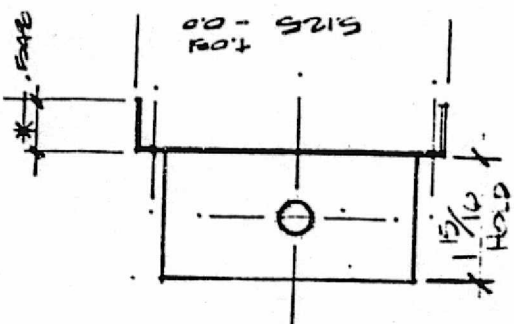
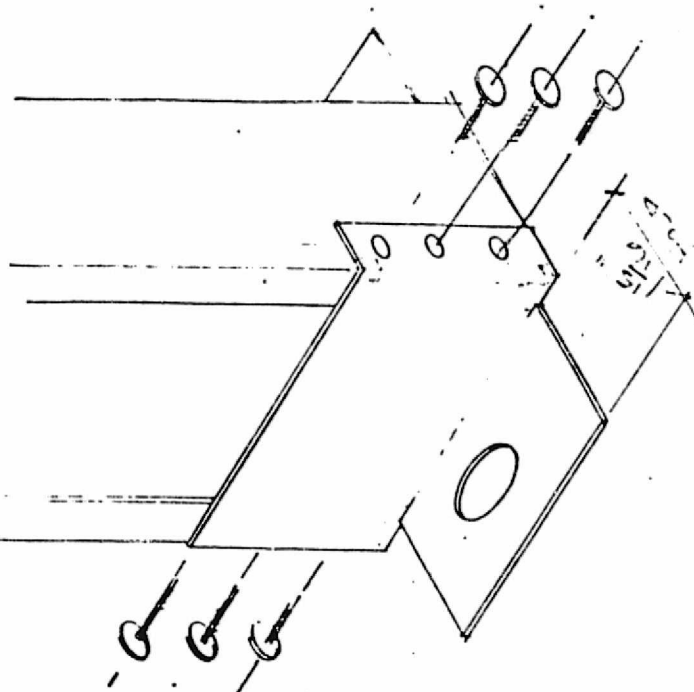
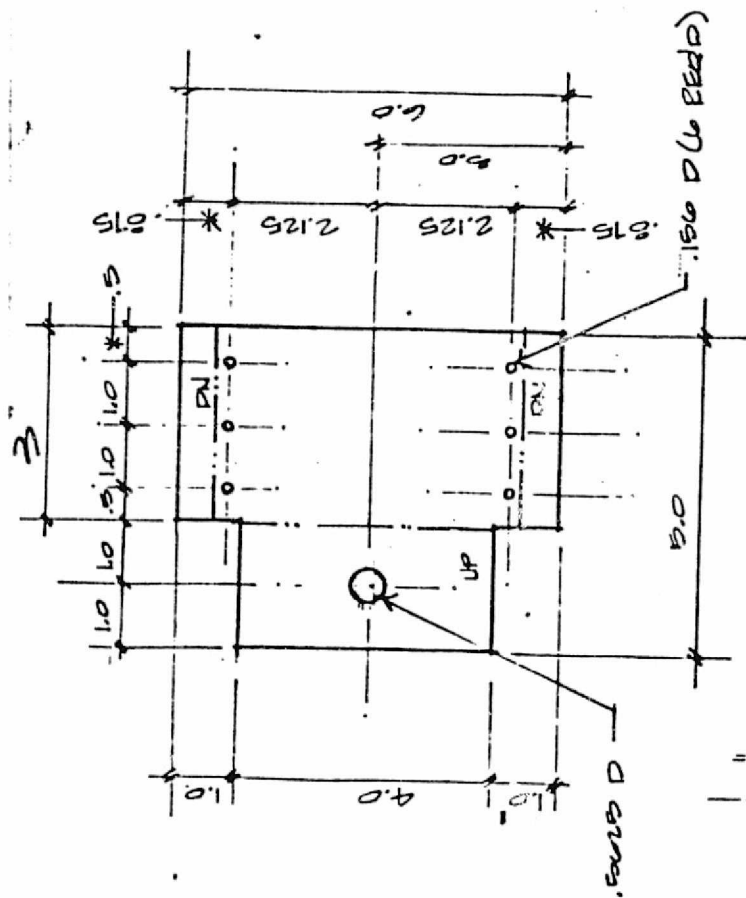
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NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

FLANGE STIFFENER/ BASE ANGLE

01-06-011	
REV R6	DATE
10-14-77	1

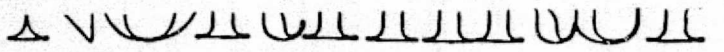


FLANGE STIFFENER/BASE ANGLE

16 GS. CAN. RECD (01-01-01)
SHEAR SIZE 5.0x6.0 (.21 FT)
ALL BENDS 90°
REFER 01-03-033 THRU -042

REV. (A) 3-30-78 (NEW) by

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 NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

01-03-012
 DATE 1-20-78

FIELD SUB-ASSEMBLY - PART
 SHOP FINAL ASSEMBLY - PART
 SHOP SUB-ASSEMBLY - PART
 PART

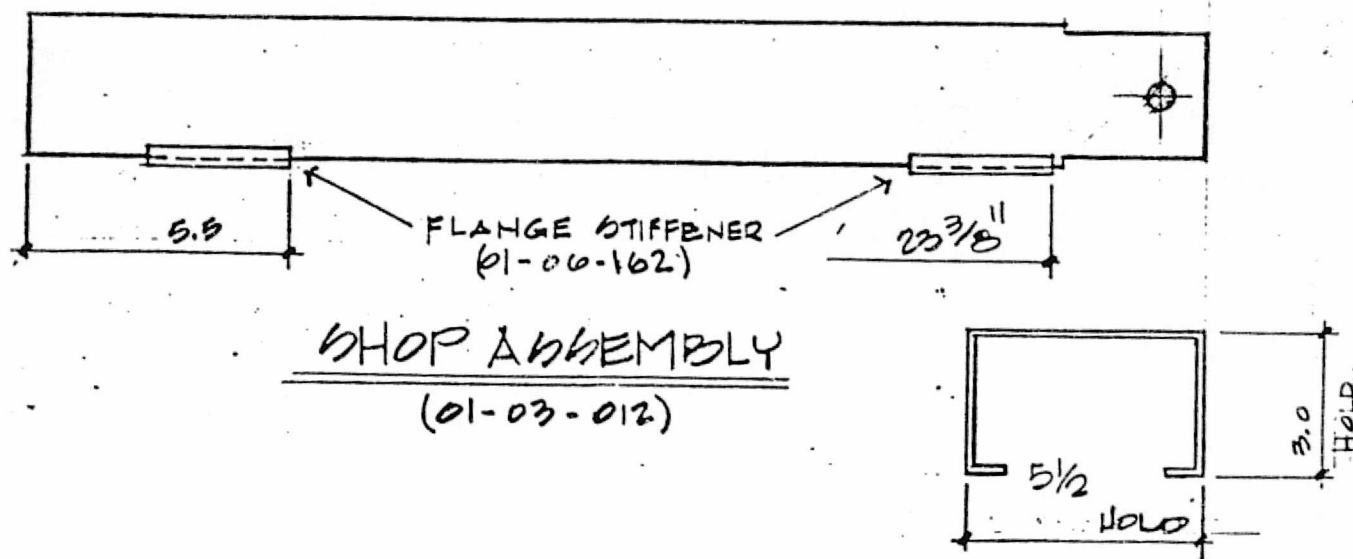
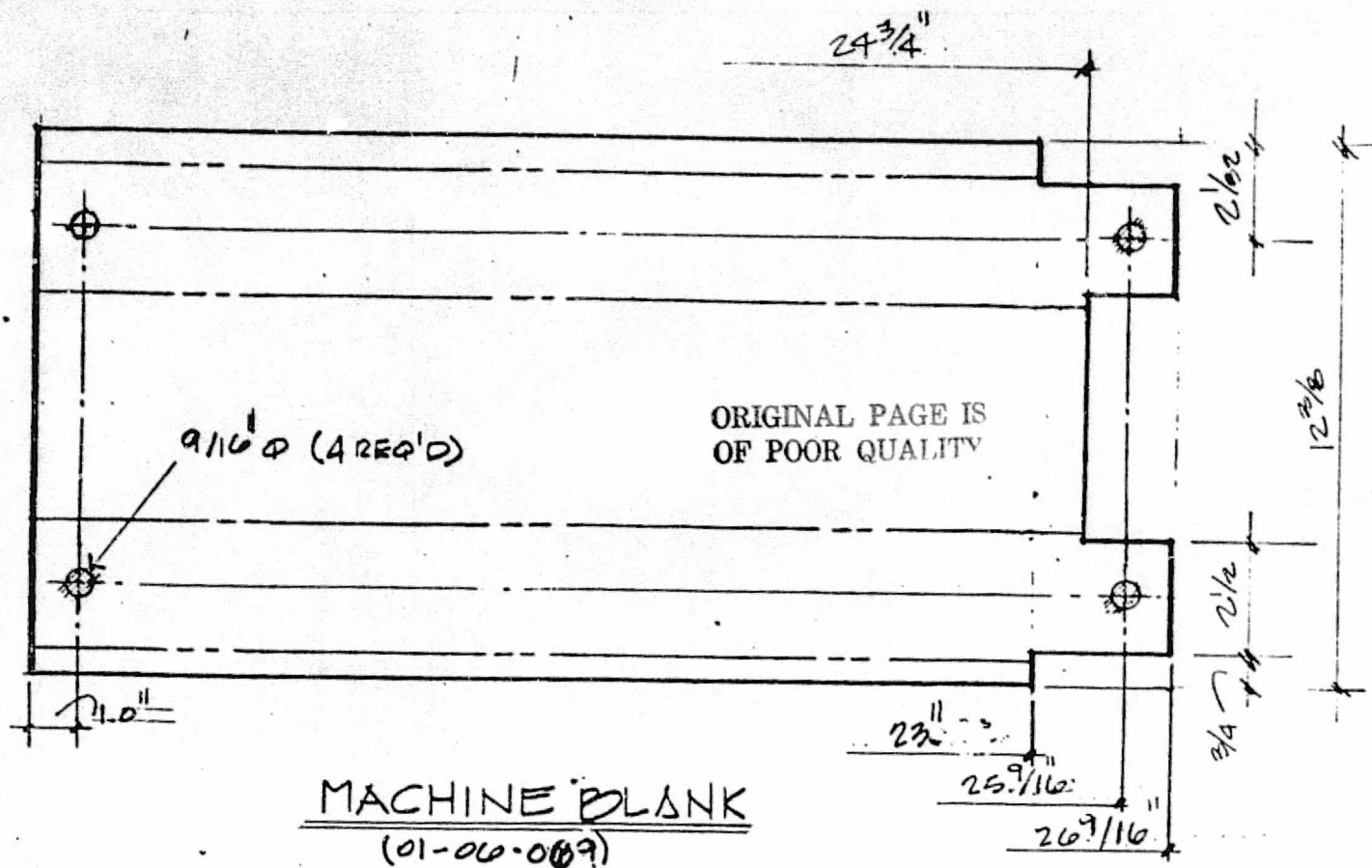
SOUTH BRACE
 ASSEMBLY
 REV LIT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-012 SOUTH BRACE ASSEMBLY

1	01-00-069	SOUTH BRACE, $12\frac{3}{8} \times 26\frac{9}{16}$ (2.23 FT ²) SEE 01-03-012
2	01-00-023	FLANGE STIFFENER, 6x3 (.125 FT ²)
12	01-11-008	SCREWS - #8x1/2 A.D.E.S.T.

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MATERIAL

16 GA. GALV. REQ'D (01-01-001)
 SHEAR SIZE 12 3/8" x 26 9/16" 2.25 FT²

REV A LEDESIGN 1-26-73 RB

NORTHROP
 ORTHRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

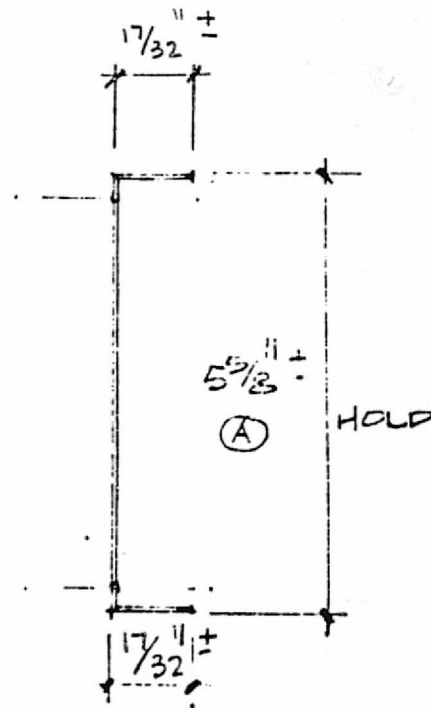
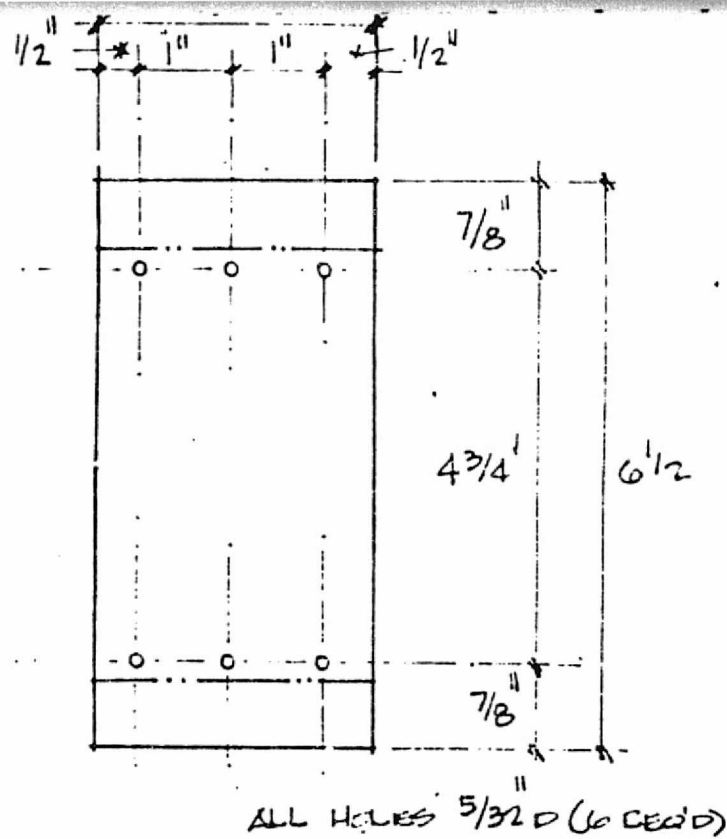
**SOUTH BRACE
 ASSEMBLY**

01-06-069

01-03-012	
DRN	CHK
BCI	REV

FLANGE
STIFFENER

01-06-162	DRN
b9	CHK
4-12-78	REV



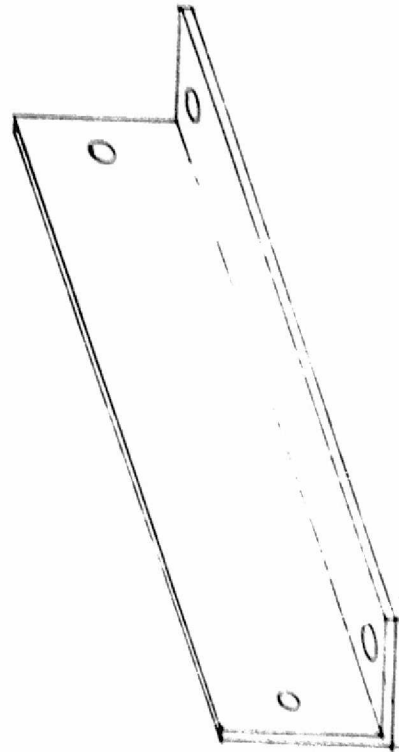
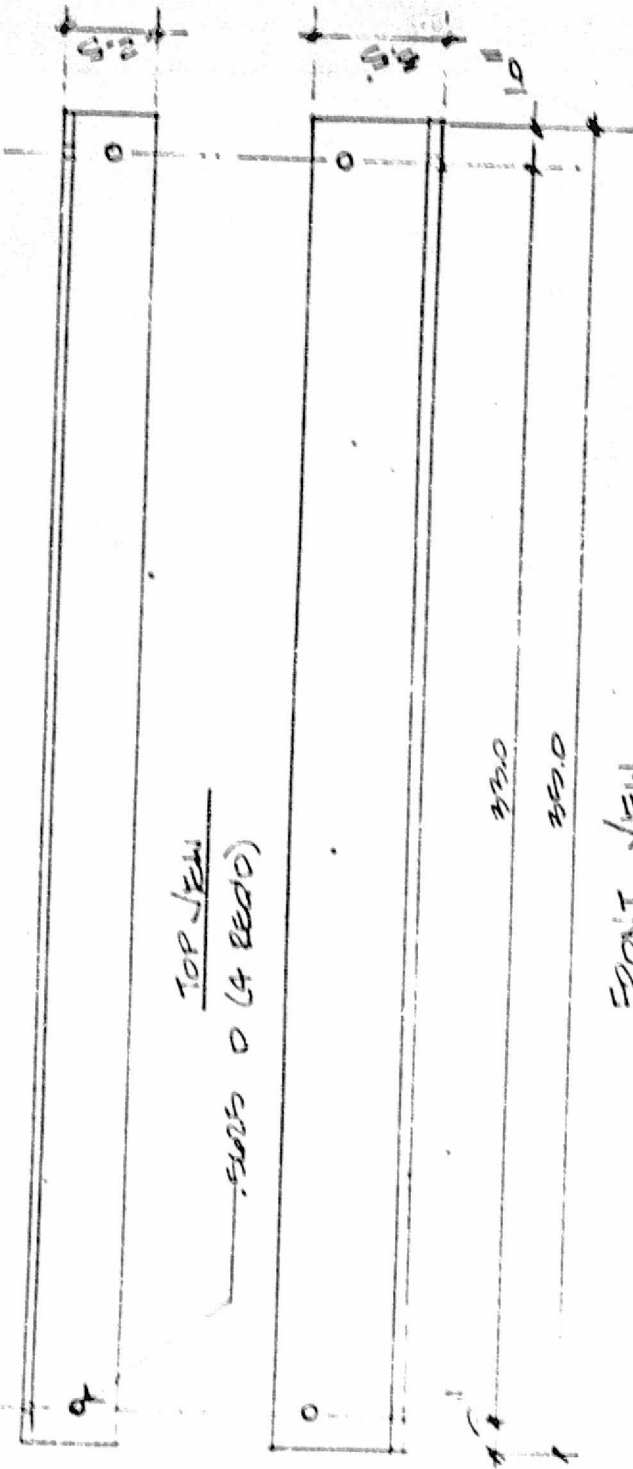
NOTE: TOLERANCE PER DIMENSION
 (A) = $\begin{matrix} +.031 \\ -.0 \end{matrix}$

FLANGE STIFFENERS

6 GA. GALV. REQ'D. (01-01-001)
 SHEAR SIZE $3\frac{1}{2} \times 6\frac{1}{2}$ " (.135 FT²)
 ALL BENDS 90°

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SOUTH COL. BASE ANGLES (D)
MADE FROM $3\frac{1}{2}" \times 2\frac{1}{2}" \times \frac{1}{4}"$
6061-T6 ALUM. (01-312)
1.68 LBS/L.F.



WORTHINGTON
WORTHINGTON, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

South Column
Base Angles (D)

(D)

01-09-003		
DRN	RE	CHK
01-09-003	REV	A

01-03-023

DATE

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

FLUID INLET
ASSEMBLY

(E)

REV

Sht. 1 of 1

PART. NO. / REV / DESCRIPTION

01-03-023 FLUID INLET ASSEMBLY

01-09-018 VALVE ADAPTER 1/2 I.D. SWEAT X 3/4 F.P.T.

01-09-013 LEAD TUBE 3/4 NOM. X 2" TYPE "M" COPPER. (01-122)

01-09-012 FLUID INLET PIPE, 1 1/4 I.D. X 10", TYPE "B" COPPER.
(01-124)

01-17-123 ROD, 3/8" DIA. AS REQ'D (01-500)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-063

DATE

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

FLUID OUTLET
ASSEMBLY

(F)

REV

CHG. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-063 FLUID OUTLET ASSEMBLY

1	01-09-018	ADAPTER - 1/8 ID SWEAT X 3/4 F.P.T.
1	01-09-011	ADAPTER - 3/8 I.D. SWEAT X 1/4 M.P.T.
1	01-08-018	LEAD TUBE - 3/4 ID X 2" TYPE M, COPPER
1	01-08-011	LEAD TUBE - 1/4 ID. X 5" TYPE M, COPPER
1	01-08-012	FLUID OUTLET PIPE - 1/4 ID. X 10" TYPE M, COPPER
1	01-17-123	ROD, BRAZING, AS REQ'D. 01-500.

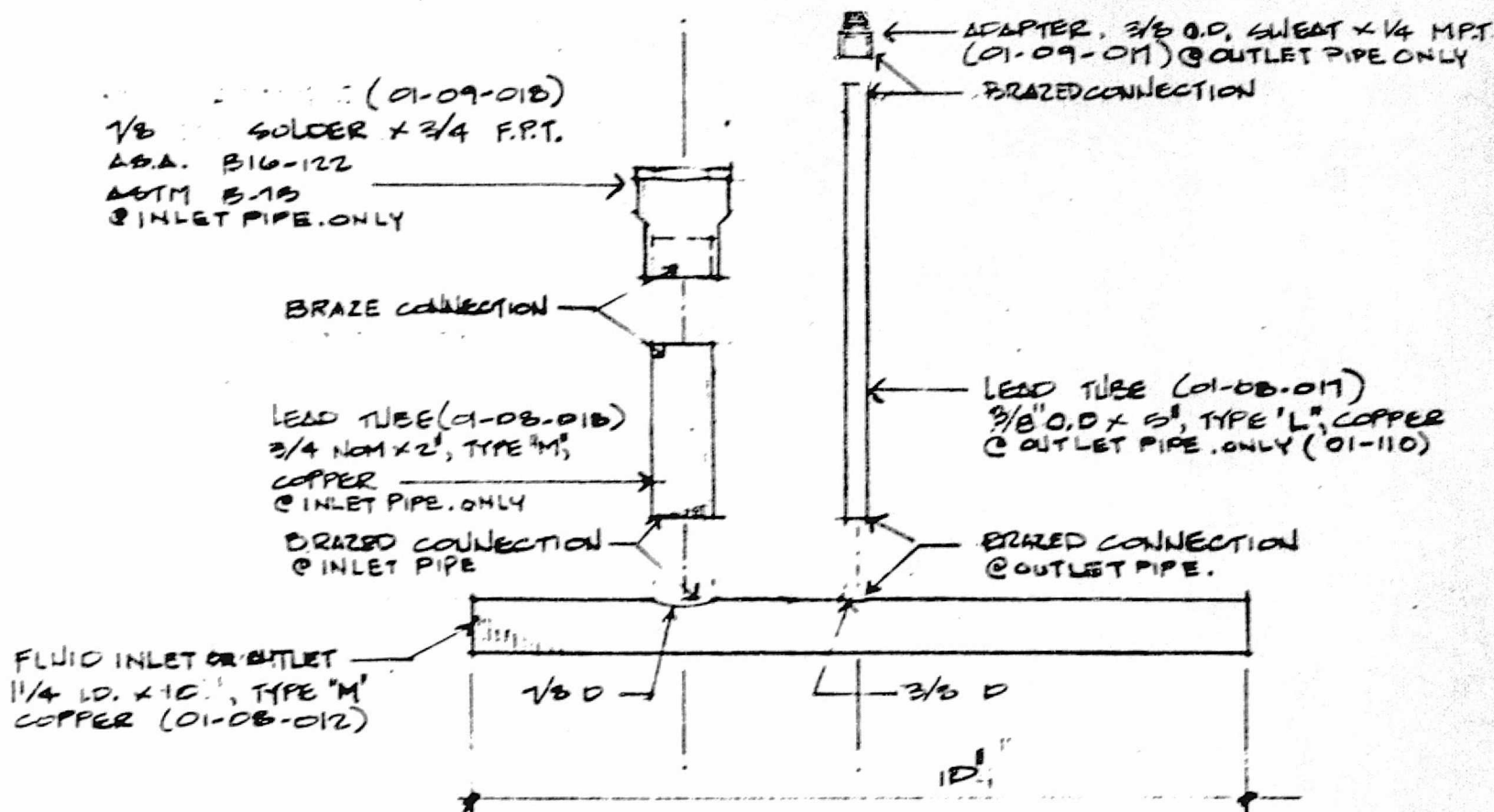
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THURUP

202

FLUID INLET OR OUTLET
(As Noted)
Assembly

01-03-003	DRN	ED	CHK
1-10-75	REV		



FLUID INLET OR OUTLET ASSEMBLY
 NOT TO SCALE

REF DWG/MT # 1-03-003
FOR WORK THIS SHEET

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LEAD TUBE

01-08-07

DRN

CHK

REV

ASSEMBLY

PARTS / ASSEMBLY

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

01-03-068
DATE

FIELD SUB-ASSEMBLY - PART
 ↳ SHOP FINAL ASSEMBLY - PART
 ↳ SHOP SUB-ASSEMBLY - PART
 ↳ PART

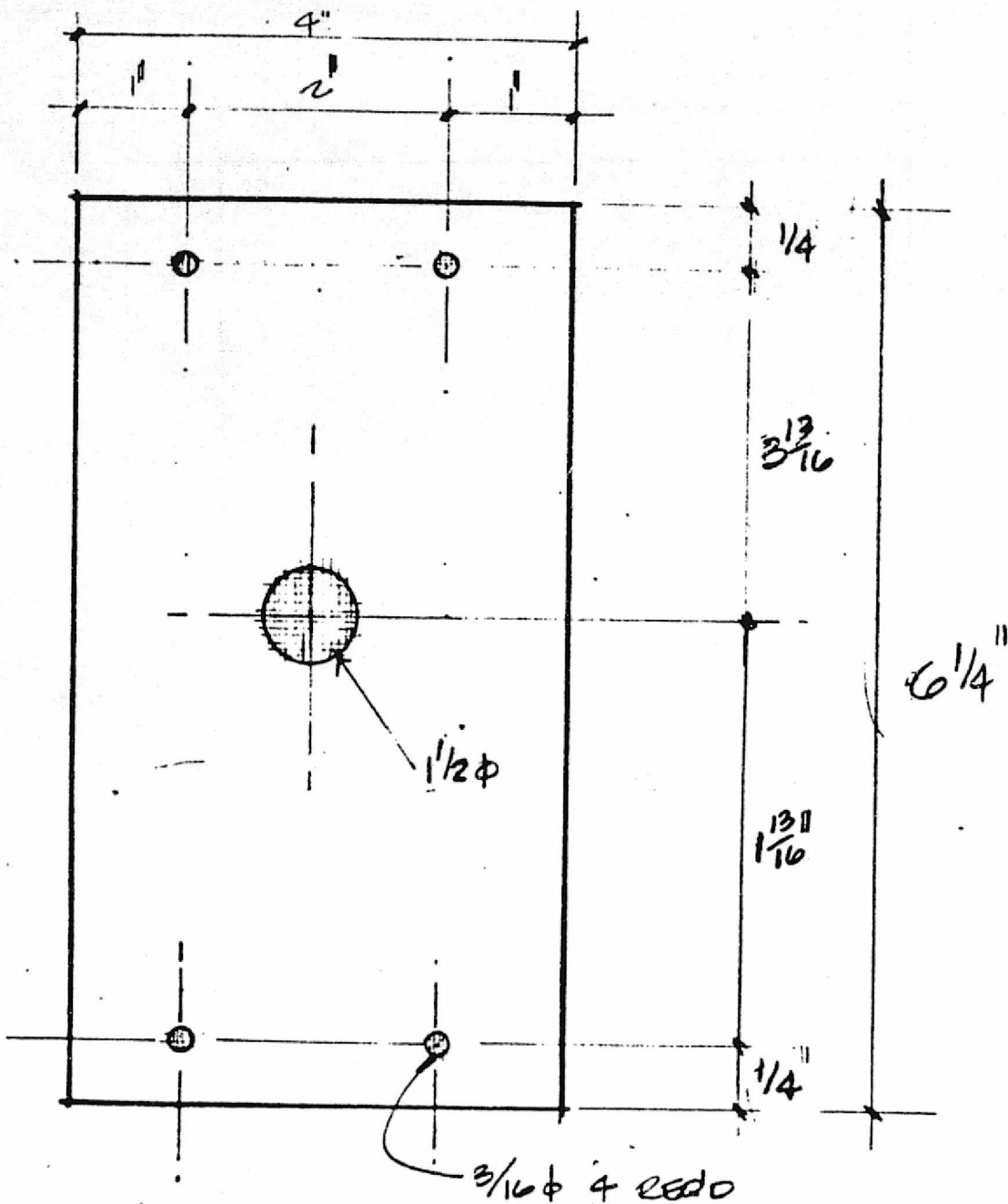
CLOSURE PLATE (E)
(F)

REV QTY. 1 OF 1

PART. NO. / REV / DESCRIPTION

1	01-03-068	CLOSURE PLATE W/1 1/2" DIA HOLE. 16 GA. GALV. 4X6 1/4 (.170 FT ²)
1	01-06-056	CLOSURE PLATE 16 GA GALV. 4X6 1/4 (.17 FT ²)
1	01-21-004	WEATHER STRIPPING 17 1/2 INCHES REQ'D.

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CLOSURE PLATE 3/4 MAN.

NO SCALE

16 CS. C.W. (01-01-001)

WHEEL SIZE 4x6 1/4 (-170 FT²)

NORTHROP

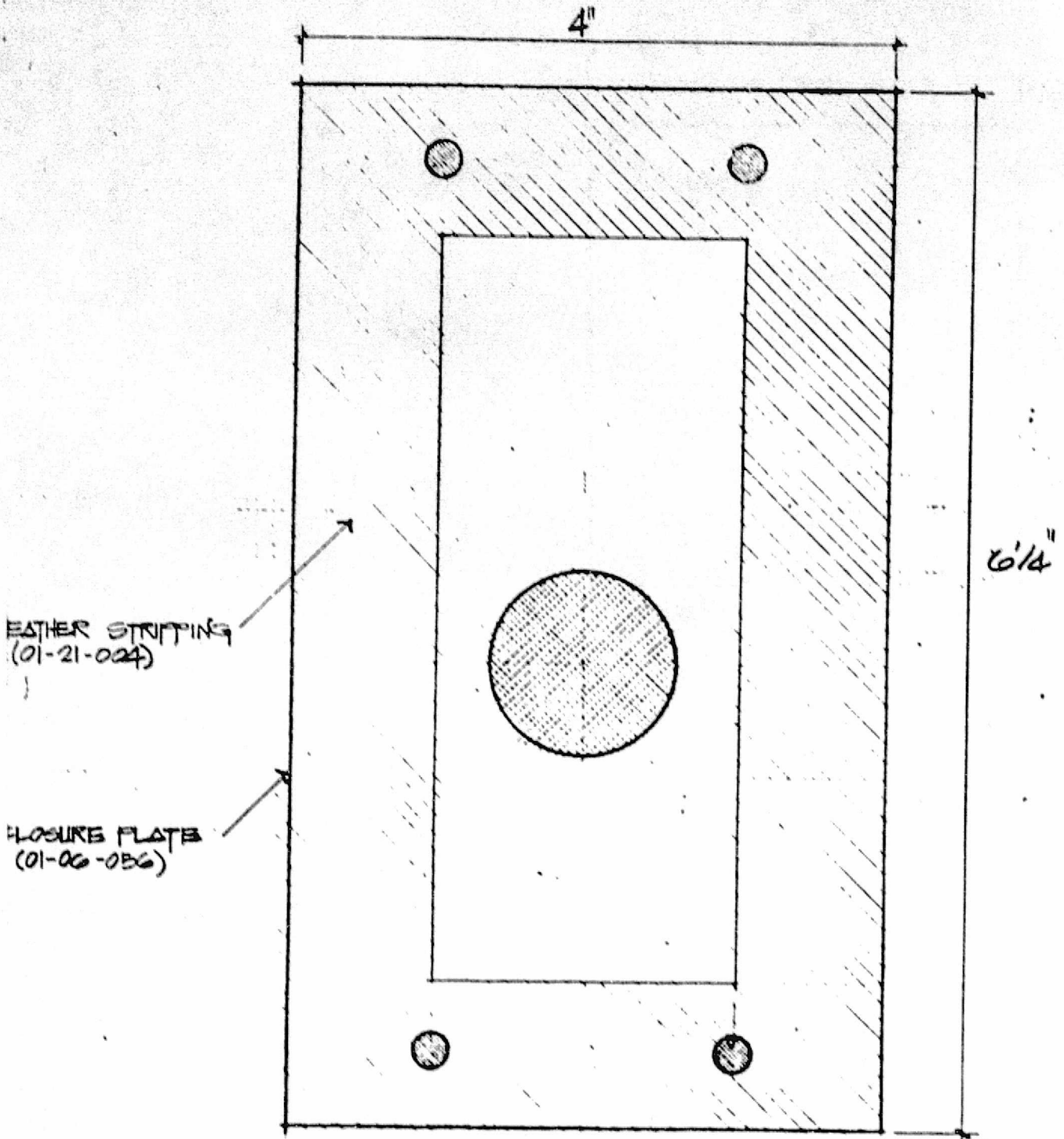
ORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CLOSURE PLATE
1 1/4 MANIFOLD (E)
(F)

01-06-056

DRN RB CHK

115-18 REV



CLOSURE PLATE

NORTHROP

REV. A 3-30-73 G.B. 149
INLET OR OUTLET
CLOSURE PLATE

01-03-058	
DRN KDS	CHK RB

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-009

DATE 2-2-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

CLOSURE PLATE (G)

REV

QTY. 1 OF 1

PART. NO. / REV / DESCRIPTION

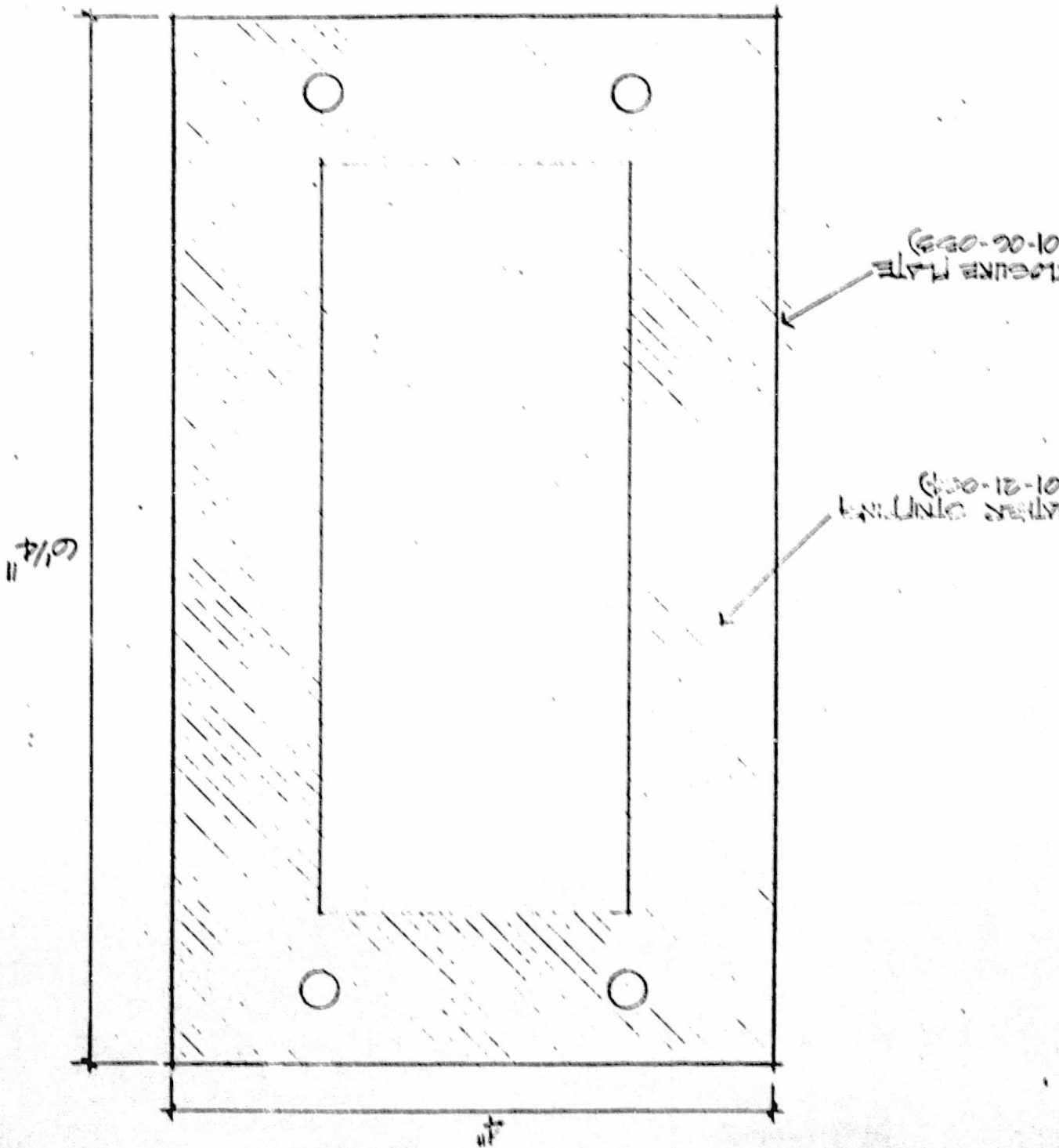
01-03-073 CLOSURE PLATE 16 GA. GALV. 4x6 1/4 (.170 FT²)

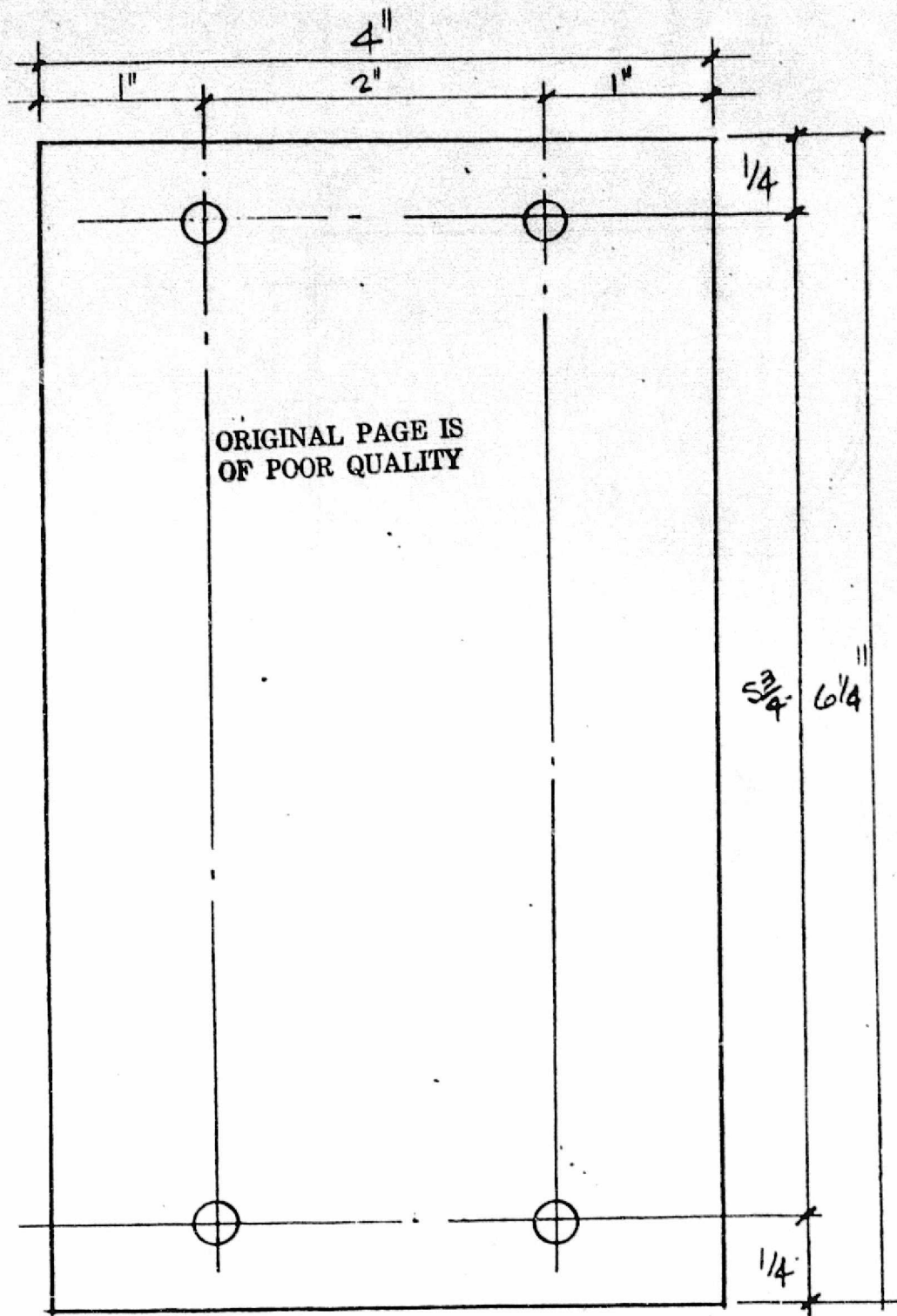
01-06-059 CLOSURE PLATE 16 GA. GALV. 4x7 (.20)

01-21-004 WEATHER STRIPPING 17 1/2 INCHES REQ'D

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CLOSURE PLATE





MATERIAL 16 GA. 01-001
 4 x 6 1/4 (-170 FT²)

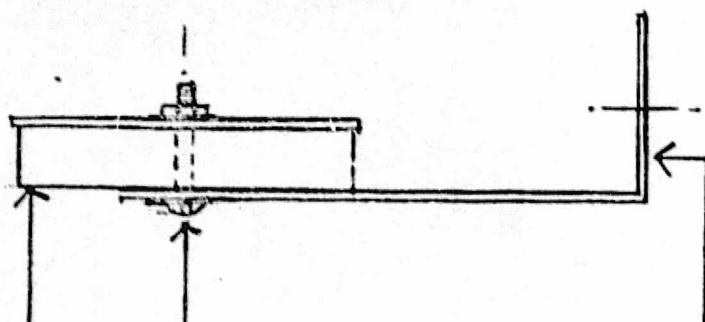
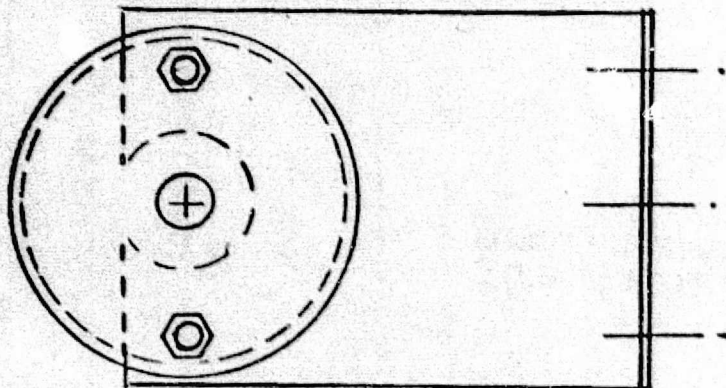
NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CLOSURE PLATE
 BLANK (C)

01-00-053

DRN	log	CHK
2-2-70		REV



01-18-004
CABLE GUIDE

01-17-022 & 021
#6 RHND. SCREW, WASHER
& LOCKWASHER.

01-06-173
CABLE GUIDE BKT.

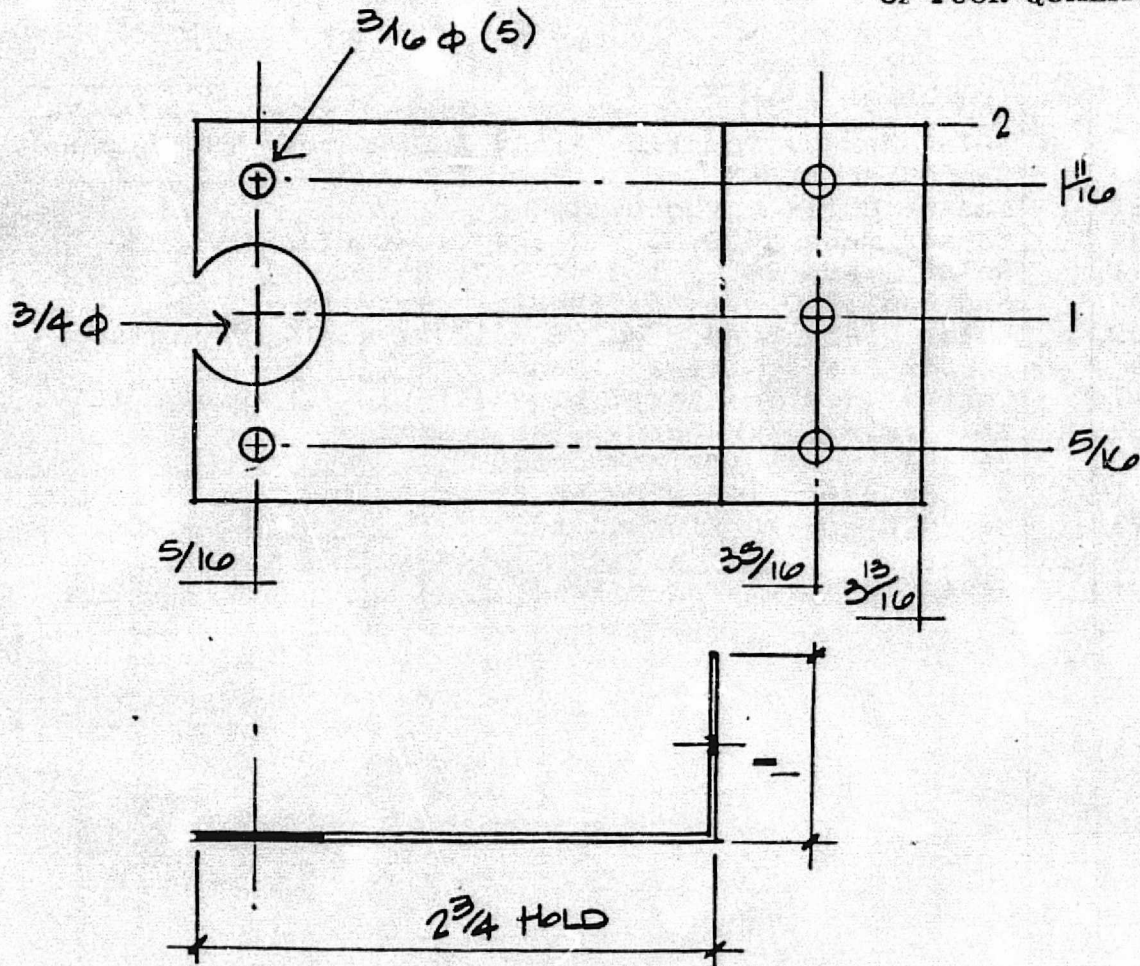
ORTHURUP

INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CABLE GUIDE
BRACKET
ASSEMBLY

01-03-032	
DRG	FILE
BG	
DATE	CHK.
1-2-74	

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MATERIAL 16 GA GALV. (01-001)
SHEAR SIZE 2X 3 13/16

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NORTHROP, INCORPORATED 302 Nichols Drive Hutchins Texas 75141

BRACKET
CABLE GUIDE

01-06-173

BOG CHK

REV.

ASSEMBLY
PARTS/ASSEMB

SENSOR ASSEMBLY

TRD-3

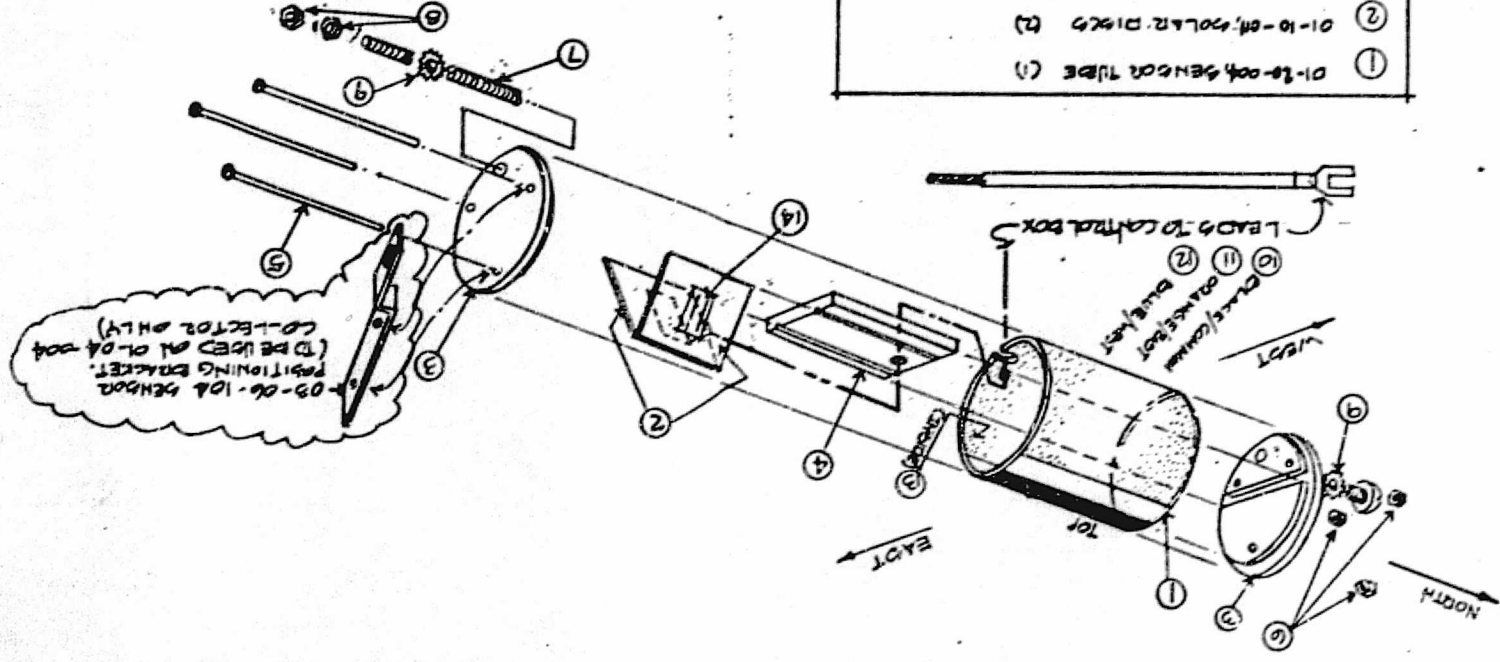
DATE: 1/31/78
REV.
SHEET 1 OF 1

	P/N	REV	DESCRIPTION
	00-04-077		Solar Sensor Mounting Field Subassembly TRD-3 sensor
1	01-03-053		SENSOR ASSEMBLY
2	01-10-012		Sensor Cells - Photovoltaic
1	01-20-004		Sensor Tube 3" O.D. x 2 3/4" Clear Plexiglass
*	01-10-011		Solar Discs 2 1/2" x 1 3/4" P.C. Board
2	01-20-002		End Cap 3" O.D. x 3/16" Black Acrylic
1	01-20-003		Solar Discs Base 2 3/8" x 2 23/32 x 3/16 Plexiglass
2	01-10-15		Sensor Discs Wire 2" length blk
1	01-10-017		Control Box Leads (1) blue (1) blk (1) orange 10'
3	01-17-060		#6 - 32 x 3 1/8 Screw Zinc Coated
3	01-17-022		#6 - 32 Hex Nut Zinc Coated
1	01-17-061		1/2 - 20 x 4" slotted RN HD Stove Bolt
2	01-17-075		Hex Nut 1/2 - 20 Zinc Coated
2	01-17-076		Star Lock Washer 1/2 Zinc Coated
1	01-06-104		Sensor Positioning Bracket

*00-10-039 May be substituted for 01-10-11

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NOTE: KNOT CONTROL BOX LEAD.
APPLY DILUENT (LEAD) SEALANT,
OPENING WHERE LEAD EXITS,
AFTER FINAL ASSEMBLY.

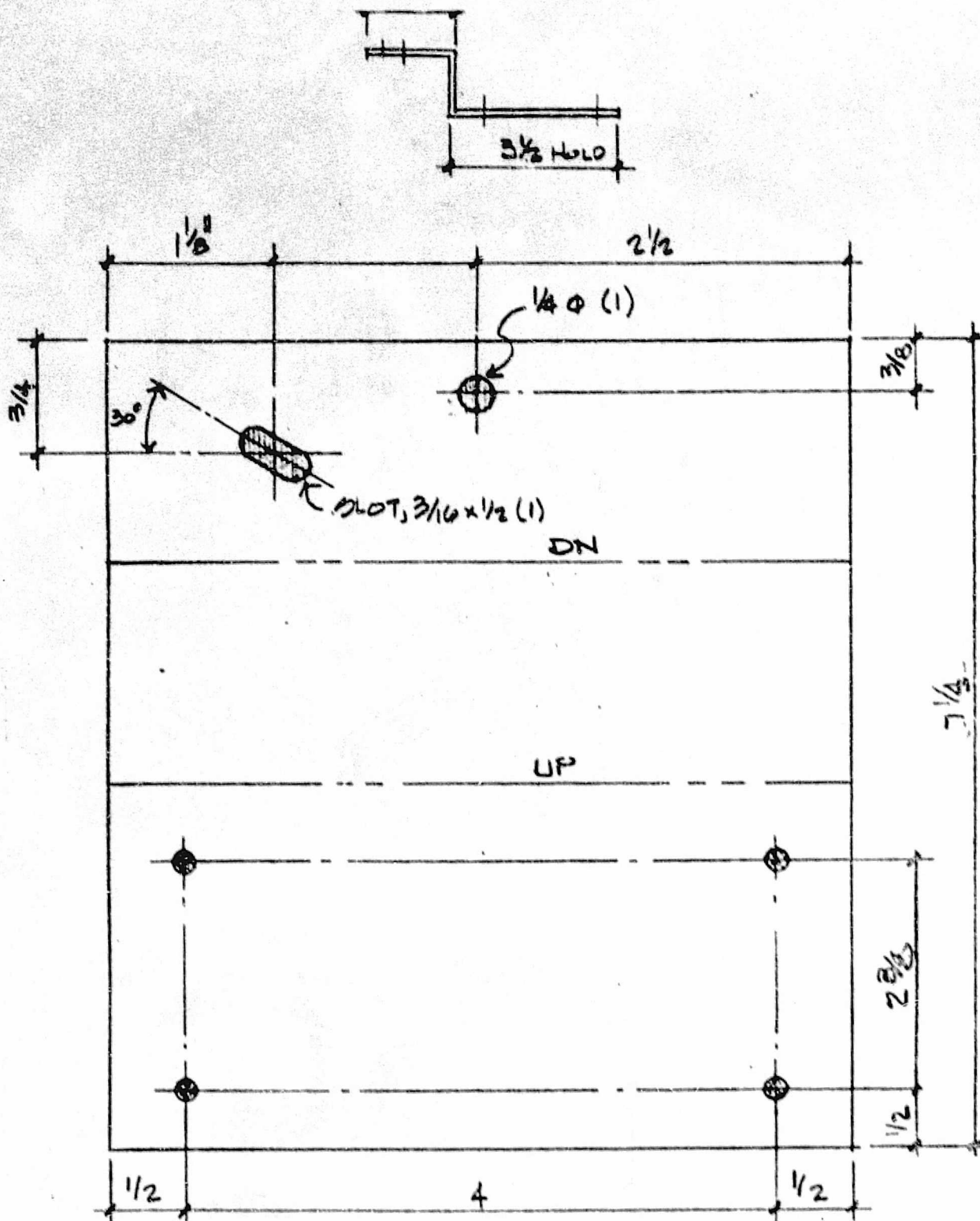


- ① 01-10-004 SENSOR TUBE (1)
- ② 01-10-011 SOLAR DISK (2)
- ③ 01-20-002 END CAP (2)
- ④ 01-10-003 SOLAR DISK BRACKET (1)
- ⑤ 01-11-000 SCREW "UNF" (3)
- ⑥ 01-17-022 NUT, HEX "UNF" (2)
- ⑦ 01-11-004 PLATED RM. HD SCREW 1/8-20 x 4 (1)
- ⑧ 01-17-015 HEX. NUT, 1/8-20 (2)
- ⑨ 01-17-019, 01-17-012 LOCK WASHER (2)
- ⑩ 01-10-017 CONTROL BOX LEADS (2)
- ⑪ 01-10-015 SOLAR DISK WIRE - 2' LONG (2) (NOT SHOWN)
- ⑫ 01-10-012 SENSOR CELL (2)

NORTHROP, INCORPORATED THE NORTHROP DATA, NORTHROP, TEXAS 75141

SOLAR SENSOR
SUB-ASSEMBLY

01-03-053	01-03-053	01-03-053
01-03-053	01-03-053	01-03-053
01-03-053	01-03-053	01-03-053



MATERIAL

16. GA. GALV. REOD
SHEAR SIZE 5 X 7.25 (0.25271²)

3-31-78

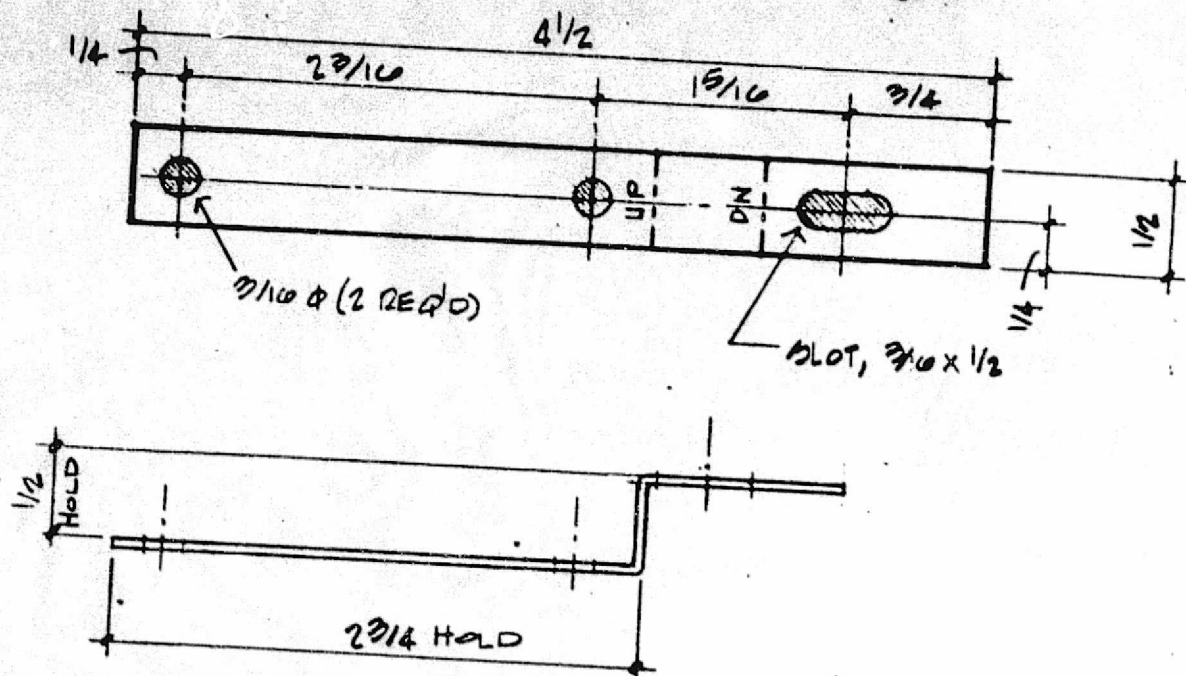
JOINTHORUP

JOINTHORUP INCORPORATED 303 Michoud Rd. Michoud, Texas 75458

SOLAR SENSOR
MOUNT

01-00-110	
DRN	CHK
56	REV

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MATERIAL:

16 GA. GALV. REED (01-01-001)
SHEER SIZE $4\frac{1}{2} \times 0\frac{1}{2}$ (.015 MAX. FT.)
ALL BENDS 90°, .016

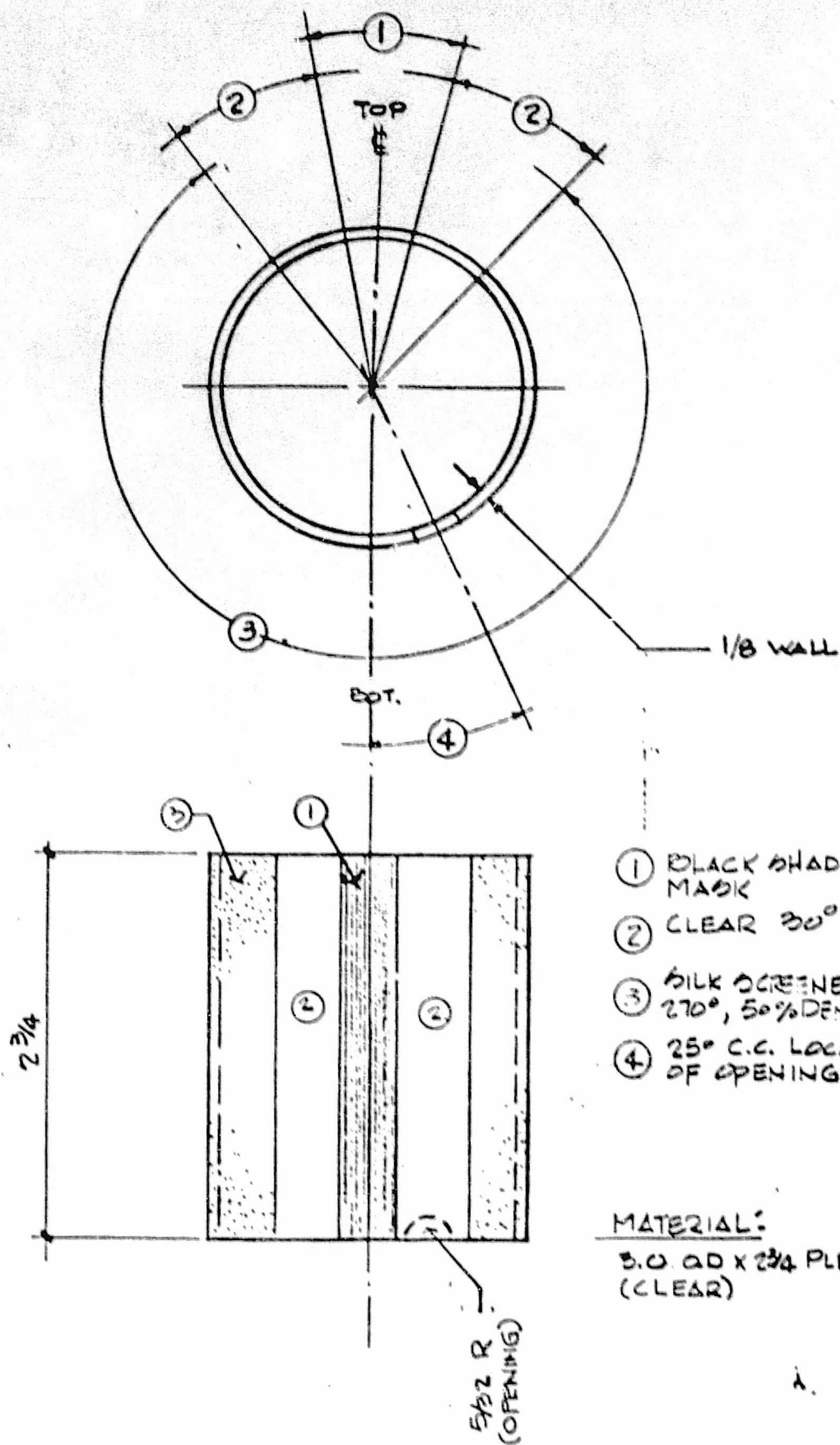
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SENSOR POSITIONING
BRACKET
(TOLUNIT)

215

03-06-104	
DRN	CHK
1-18-78	REV



- ① BLACK SHADOW 30° MASK
- ② CLEAR 30°
- ③ SILK SCREENED MASK 270°, 50% DENSITY, 42/2 LINE
- ④ 25° C.C. LOCATION OF OPENING.

MATERIAL:

3.0 OD X $2\frac{3}{4}$ PLEXIGLAS (CLEAR)

JOINTHORUP

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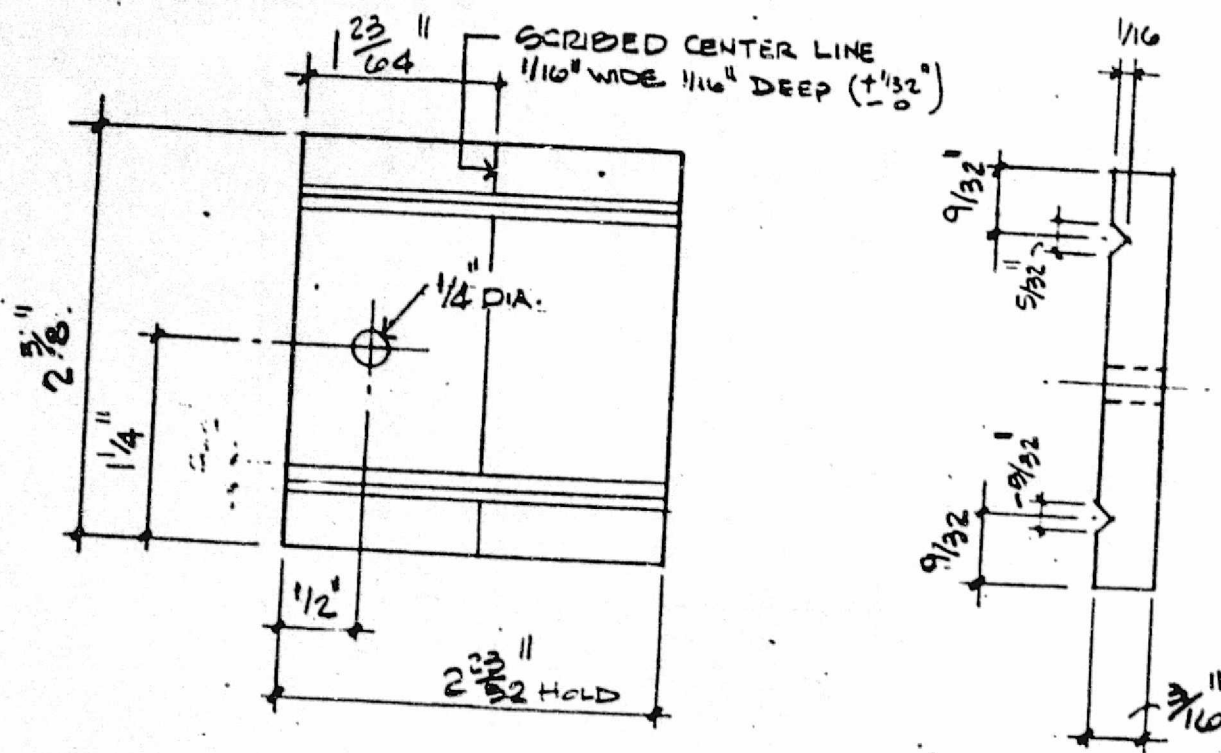
SENSOR TUBE

01-20-024

DRN θ_{L1} CHK

REV

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MATERIAL:

CLEAR PLEXIGLAS $2\frac{5}{8}$ " X $2\frac{3}{32}$ " X $\frac{3}{16}$ "

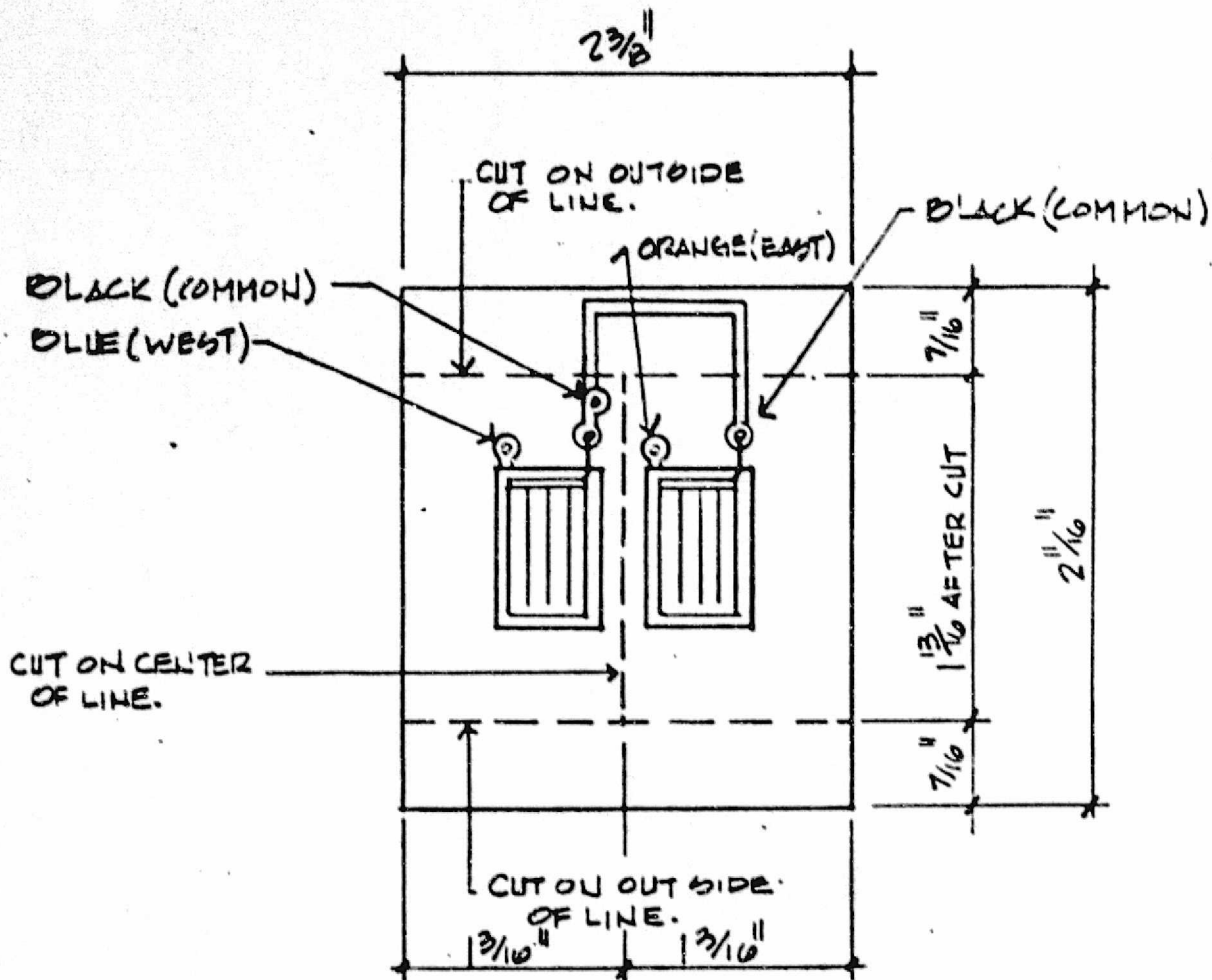
NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Moline, Texas 75801

TRD-3
SOLAR DISCS
BASE

3-13-73 REV A.

01-10-015	
DRN BG	CHK
REV	



NOTE:

CUT ENDS OFF FIRST
THEN CUT UNIT IN HALF.

NORTHROP

HRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

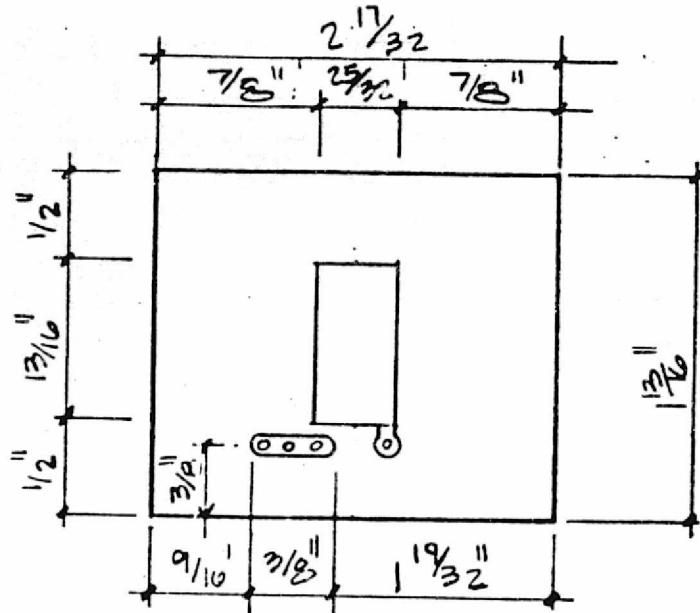
SOLAR DISCS
FOR TRD-3

00-10-011

DRN 09 CHK

3-9-73 REV

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MATERIALS: PC BOARD
AND CONDUCTOR.

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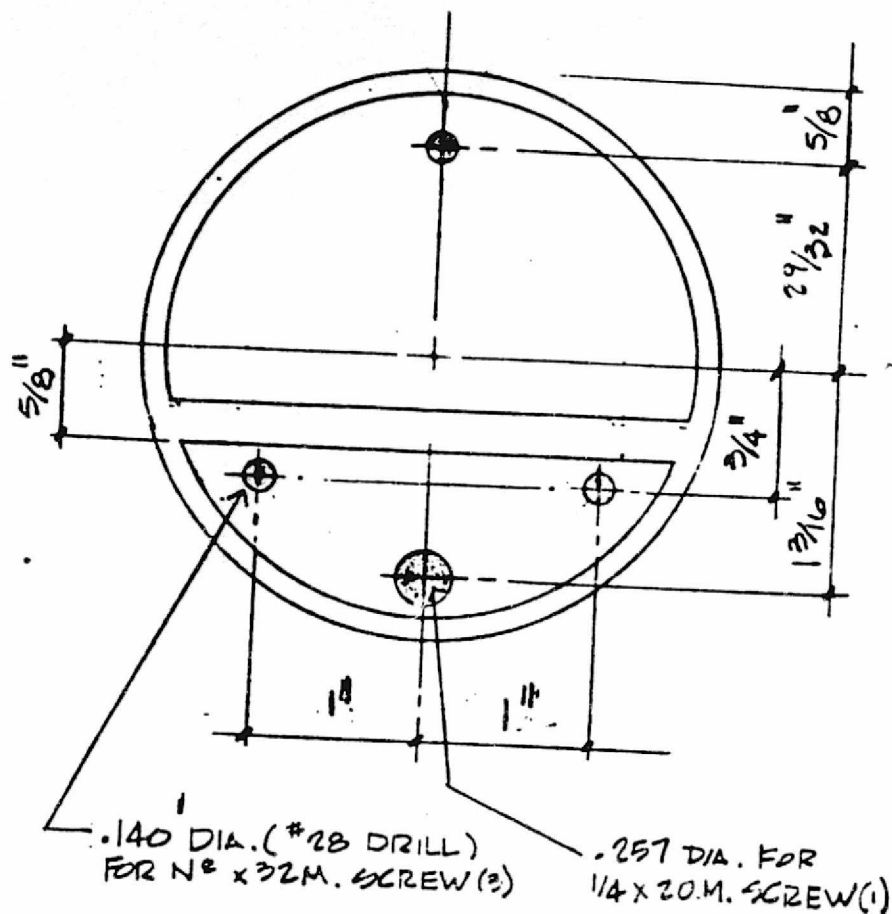
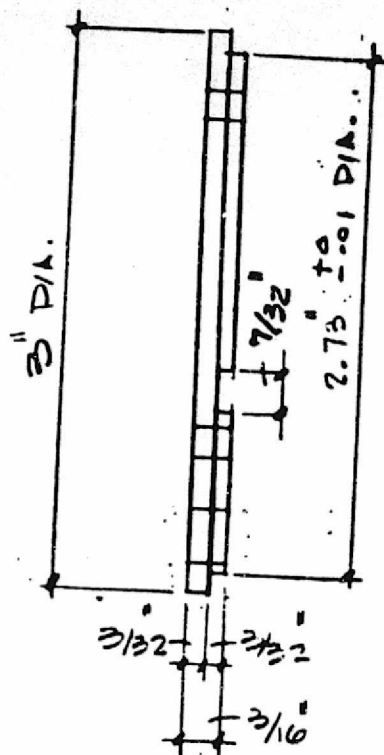
SOLAR SENSOR
DISCS

REV 3-9-79

01-10-039

DRN 09	CHK
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1-29-79	REV 1
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MATERIAL:

BLACK PLEXIGLAS (ACRYLIC)

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NORTHROP

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TRD-3
SOLAR SENSOR
END CAP

01-20-002	
DRN BG	CHK
REV	